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THESIS

MITIGATING COST AND SCHEDULE RISK FROM ENVIRONMENTAL LITIGATION OVER DOD PROJECTS IN HAWAII

by

Michael R. Stefani

March 2013

Thesis Advisor: David H. Olwell
Second Reader: Joseph W. Sweeney III

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The National Environmental Policy Act of 1969, coupled with advances in communication technology, have brought the general public into the decision-making process for environmental reviews required to make federally funded infrastructure project decisions. This public participation is well pronounced in the state of Hawaii with its strong environmental, historical, and cultural ties. This public involvement, along with the often variable analysis and communication requirements, has the potential to add significant cost and schedule risk to ongoing and future infrastructure development projects. This thesis evaluates past project challenges and provides common themes and lessons learned to reduce the likelihood of repeating past mistakes. It is envisioned that the Department of Defense will be able to use this information to reduce cost and schedule risk for future infrastructure projects in the state of Hawaii.

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MITIGATING COST AND SCHEDULE RISK FROM ENVIRONMENTAL LITIGATION OVER DOD PROJECTS IN HAWAII

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN SYSTEMS ENGINEERING MANAGEMENT

from the

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ABSTRACT

The National Environmental Policy Act of 1969, coupled with advances in communication technology, have brought the general public into the decision-making process for environmental reviews required to make federally funded infrastructure project decisions. This public participation is well pronounced in the state of Hawaii with its strong environmental, historical, and cultural ties. This public involvement, along with the often variable analysis and communication requirements, has the potential to add significant cost and schedule risk to ongoing and future infrastructure development projects. This thesis evaluates past project challenges and provides common themes and lessons learned to reduce the likelihood of repeating past mistakes. It is envisioned that the Department of Defense will be able to use this information to reduce cost and schedule risk for future infrastructure projects in the state of Hawaii.

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LIST OF ACRONYMS AND ABBREVIATIONS

AoA…….. Analysis of Alternative

CEA…….. Cumulative Effects Analysis

CFR…….. Code of Federal Regulations

DAU…….. Defense Acquisition University

DEIS…….. Draft Environmental Impact Statement

DoD…….. Department of Defense

DON…….. Department of the Navy

DTS…….. Department of Transportation Services

EA…… Environmental Assessment

EIS…… Environmental Impact Statement

FAA……. Federal Aviation Administration

FEIS……. Final Environmental Impact Statement

FTA…….. Federal Transit Administration

GSA…….. General Service Administration

HART…….... Honolulu Area Rail Rapid Transit

HEPA…… Hawaii Environmental Policy Act

HHCTCP….. Honolulu High-Capacity Transit Corridor Project

HRS…….. Hawaii Revised Status

HRTP…… Honolulu Rail Transit Project

NASA…….... National Aeronautics and Space Administration

NEPA……. National Environmental Policy Act

NHPA…….... National Historic Prevention Act

NOAA…….. National Oceanic and Atmospheric Administration

NOI…….. Notice Of Intent

OEQC…….... Office of Environmental Quality Control

OHA……... Office of Hawaiian Affairs

PEEP…… Preliminary Engineering and Evaluation Program

ROD……..… Record of Decision

EXECUTIVE SUMMARY

Over the past 50 years, we, as a nation, have become significantly more aware of the need to protect our natural environment and the potential for significant negative environmental impacts when progress goes unchecked. The National Environmental Policy Act (NEPA) of 1969 established a federally mandated process that provided the means for the general public to be a crucial check that weighs the benefits of advancement against the costs to the environment. Since the inception of the NEPA, the courts have had a significant influence in the determination of appropriate compliance with the act and this has added, and will continue to add, significant cost and schedule risk to affected projects.

Nowhere is this cost and schedule risk more prevalent than in the state of Hawaii, where the citizens have a strong relationship with the natural environment, island culture, and island history. With a relatively small land mass and abundance of unique environmental and archeological artifacts, development permitting on the islands of Hawaii is often a lengthy and emotional process.

With the United States in the midst of its strategic pivot toward Asia, the Pacific, and the Indian Ocean, and with the Islands of Hawaii providing the United States' "gateway to Asia," there is certain to be an upswing in defense infrastructure development on the islands.

After review of three recent major infrastructure projects, two that failed and one still in progress, it is clear that to be successful the federal government, in particular the departments of Defense and Homeland Security, will need to develop a strategy to address both real and perceived environmental impacts well before project plans are approved.

With changing legal interpretation of the NEPA and the Hawaii Environmental Policy Act (HEPA), it is difficult to predict what the future will bring in the way of requirements. The review of these three infrastructure projects shows that there are common themes that contribute to cost increases and schedule delays, and that project

managers can take specific actions to reduce the cost and schedule risks associated with complying with the requirements of the NEPA and HEPA.

The research showed that the principal challenges were insufficient early public communication on key environmental concerns and a lack of effective public perception management. In all three of the case studies, these two issues alone caused significant project delays and cost increases. The research also showed that had these issues been addressed early, construction may have been delayed; however, the cost of delays would have been lower than they were post-contract award. In addition, it is likely that public trust would have been increased, reducing the amount of cost and schedule risk the program carried out of the planning phase.

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I would like to thank my wife, Denise, for her patience, understanding, and the reduction of my household duties as I worked through this program. I would also like to thank Professor David Olwell for keeping me pointed in the right direction through the development of this thesis.

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I. INTRODUCTION

A. BACKGROUND

The United States Department of Defense (DoD) has had a strong military presence in the state of Hawaii that dates before the infamous attack on Pearl Harbor in 1941. According to Hawaii's Department of Business, Economic Development and Tourism, in 2009, there were more than 60,000 people employed by the military in Hawaii (Department of Business, Economic Development and Tourism, 2010). In addition there were roughly 60,000 military dependents residing in the state. With a state population of just under 1.4 million, this accounts for nearly 10% of the population. It is no wonder that the United States DoD is the second major source of revenue to the state of Hawaii, falling second only to tourism.

Despite the military's long history and significant contribution to the local economy, there is continued friction between the local communities and the military. This friction can be traced as far back as 1893 when U.S. Naval forces assisted the Committee of Safety, which was comprised of mainly American and European residents, with overthrowing the Hawaiian monarchy. Today, locals are becoming increasingly concerned about the negative effects of military operations on the environment. In addition to the recent increase in tension, Hawaiians have a long history of opposition to industrial development, especially in the rural areas and on the lesser populated islands.

Today, we see the wars in the Middle East winding down, and the United States resuming its strategic shift in focus to Asia, the Pacific, and the Indian Ocean (U.S. Department of Defense, 2012) during what has been coined as America's "Pacific Century" (Clinton, 2011). Because of this shift, Hawaii, otherwise known as America's gateway to the Pacific, is poised to see an increase in defense activity both in operations and in infrastructure development. This increase in activity will result in economic growth and increased environmental impact on the island.

One of the principal stumbling blocks for infrastructure projects on the Hawaiian Islands is the development of the Environmental Impact Statement (EIS) and the Environmental Assessment (EA). It is not uncommon for the approval and litigation associated with these documents to add tens of millions of dollars and months or years of delays to major projects. Unlike most other environmental legislation, the National Environmental Policy Act of 1969 and the Hawaii Environmental Policy Act of 1974 do not prohibit federal projects from harming the environment; rather, these acts were created to inform stakeholders, to include the public, of the environmental impact, mitigation measures, and alternatives to the proposed projects. Complications arise due to various interpretations of how well stakeholders need to be informed; what alternatives need to be evaluated and to what level of detail; and what mitigation measures are feasible given cost and schedule constraints. These various interpretations generally lead to a significant amount of litigation, legal cost, project delays, and project cost overruns.

As we enter what appears to be a fiscally constrained time when it comes to defense spending, to make best use of scarce dollars it is important that the DoD have a comprehensive strategy to meet the increasing demands for environmental impact review prior to the execution of infrastructure development projects. Without an effective strategy, it will be difficult for the DoD to develop needed infrastructure within a reasonable financial and time budget.

B. PURPOSE

The purpose of this study is to assist the DoD with reducing infrastructure cost and schedule risk through a greater understanding of the EIS and EA process. Given the complexity and required investment for developing these documents it is important that project managers understand where and why past projects have stumbled and what steps could have been taken to mitigate the impact of those missteps. The development of these documents is technically and socially complex, with simple oversights turning into major cost and schedule drivers. Project managers need to actively manage the EIS and EA development process and not carry project risk by delegating to lawyers and allowing the

courts to decide the required depth of environmental and alternative analysis. By looking at both the technical and social complexities this study will assist the project manager with avoiding common mistakes, while providing insight into the mechanics of public trust.

C. RESEARCH QUESTIONS

As we become more aware of the delicate nature of our natural environment and take steps to protect it against negative impacts, we should be mindful of the need to balance progress with environmental protection. The easiest way to protect the environment is to do nothing at all, stop infrastructure development and stop technology advancement. This, however, is not practical, and one needs to accept that as we progress, there will be some level of negative environmental impact. NEPA and HEPA regulations have set the stage for the owners of this environment, the public, to have a voice in the determination of the appropriate balance. Unfortunately, if the EIS and EA development process is not executed effectively, it becomes more about politics, litigation, and monetary influence, and less about finding balance and mitigating environmental impacts. Once a project goes down this path, precious resources will be funneled away from technological progress and environmental protection measures and into the courts. For the reduction of project cost and schedule risk, and the protection of our natural environment, this process needs to be executed effectively. These requirements lead to the research questions:

1. Can the DoD reduce risk to major infrastructure development projects on the Hawaii Islands through a greater understanding of the EIS and EA development and communication process?
2. How important is public perception to the success of major infrastructure projects on the Hawaiian Islands?

D. BENEFITS OF THE STUDY

As we become more aware of how human actions impact the natural environment, we become increasingly concerned with the impacts of infrastructure, both in construction and utilization. For the DoD to successfully accomplish its mission of providing the military forces needed to deter war and to protect the security of the country, it must invest in significant infrastructure. When it comes to managing environmental impacts, we hold our federal government to the highest standard. This research is intended to provide baseline knowledge that will assist the U.S. Navy in effectively meeting the environmental impact communication requirements while reducing federally funded infrastructure project cost and schedule risk.

E. SCOPE AND METHODOLOGY

This thesis focuses on project cost and schedule impacts as a result of compliance with the NEPA and HEPA regulations. This thesis further focuses the research on impacts to major infrastructure projects undertaken in the State of Hawaii. It is important to note that NEPA and HEPA regulations are not the only federal and state environmental and land use regulations that need to be considered prior to execution of an infrastructure project. These additional requirements are touched on in the development of the case studies but because they are separate and distinct from those statutes arising as a result of the NEPA and HEPA they are not addressed in the lessons learned.

This research identified the contributing factors that led to project failure or cost growth. These factors were then grouped into themes to understand commonality across projects, understand general failure mechanics, and to determine what, if anything, the project personnel could have done to mitigate the impacts. Common themes and risk mitigation steps were then combined to develop risk mitigation strategies which could be applied across a wider variety of infrastructure projects.

The three projects used for case studies were chosen due to their differing scopes, executing activities, and intended purposes. The scopes ranged from tens of millions to

over five billion dollars. Executing activities included a private firm, the state of Hawaii, and the federal government. Intended purposes included scientific discovery, land based transportation, and ocean based transportation.

Multiple sources of information were used in the development of this thesis to include: project plans, court proceedings, project funded environmental impact documentation, and newspaper and journal articles. Project plans were evaluated to determine the planned scope of the environmental analysis and public outreach. Court proceedings were used to develop an understanding of the primary environmental and procedural concerns, the project's rebuttals, and the court's interpretation of the required extent of environmental analysis and communication. Court proceedings were also used to develop an understanding of the affiliations of those bringing suit against the projects and the strategies they employed in the event that a court found in favor of the project. Project funded environmental analysis was reviewed to understand the project's documented environmental impact and newspaper and journal articles were reviewed to understand the project's perceived impact.

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II. LITERATURE REVIEW

A. NEPA DESK GUIDE

In 1999, the General Service Administration (GSA) published the *NEPA Desk Guide*. The purpose of the guide was to assist GSA staff and contractors with meeting the requirements of the NEPA in accordance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) and GSA OrderADM1095.1F (Environmental considerations in Decision making) (U.S. General Services Administration, 1999). Although the guide was written for the GSA, because the implementing regulations are the same as for the DoD, the guide can be used as a reference for DoD project managers. The guide contains the NEPA background, requirements, and policies. The guide also provides easy-to-follow summary guidance, checklists and references, an example of which is shown in Figure 1. It is a valuable resource for a project or program manager to get a general understanding of the NEPA requirements. The guide is purely policy, items such as lessons learned, best practices, and risk mitigation techniques are not within the scope of the guide.

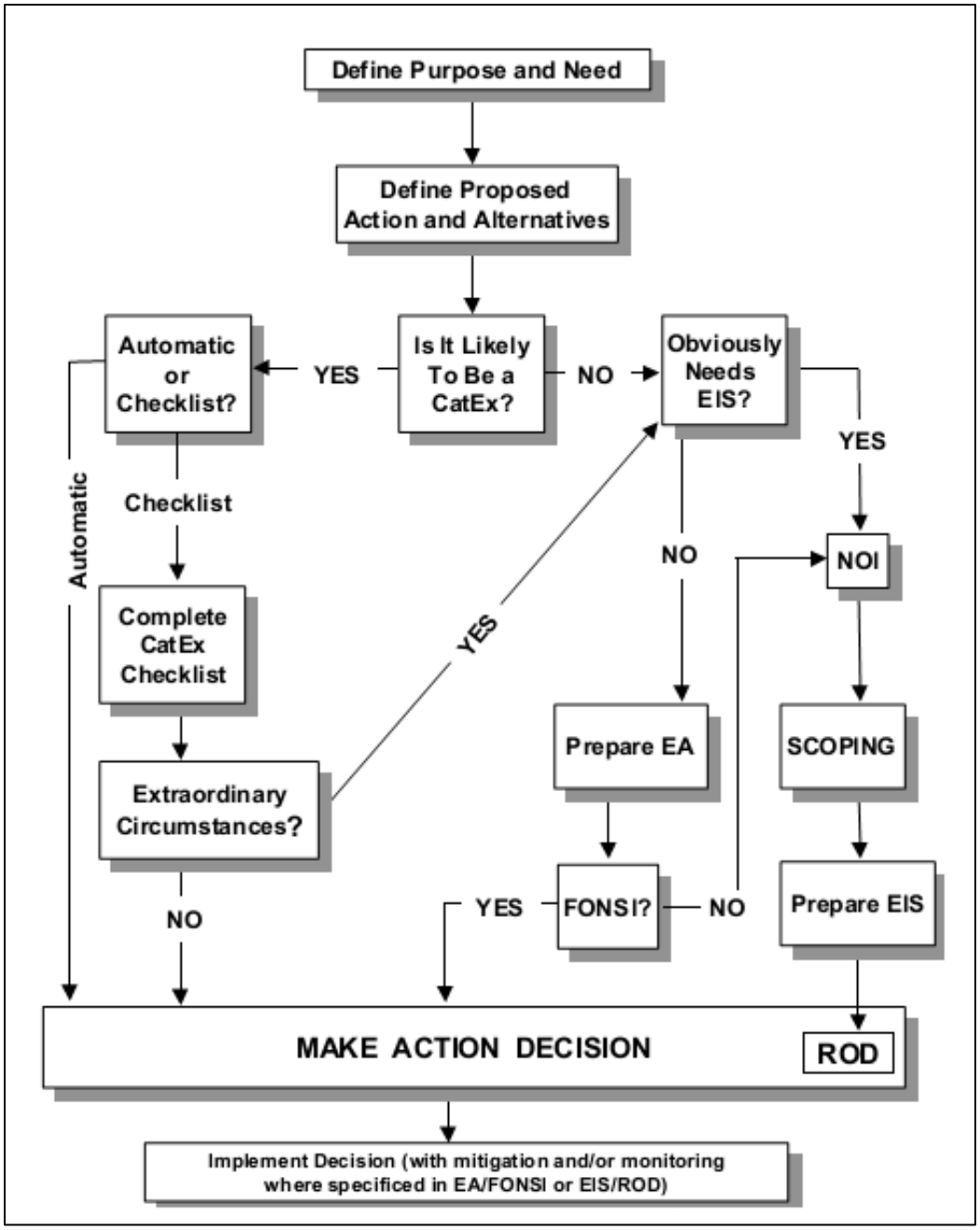

Figure 1. NEPA in a Nutshell (From U.S. General Services Administration, 1999)

B. NEPA ANALYSIS GUIDANCE MANUAL

In 2007, the U.S. Army released the NEPA Analysis Guidance Manual (Canter, Chawla, & Webster, 2007). The authors of this guide recognized that cumulative impacts

and issues are a major contributor to NEPA litigation, and developed the guide based upon Cumulative Effects Analysis (CEA) and the Council on Environmental Quality's CEA guidelines. The guide goes well beyond the GSA guide, not just in the area of cumulative effect, but in the breakout of specific Valued Environmental Components. The guide identifies 14 Valued Environmental Components and for each one provides background information, "quick look" questions, and step-by-step guidance for the impact analysis. The "quick look" questions are an essential part of the guide as they allow the project manager to evaluate the need to address a particular environmental component, based on objective questions.

Table 1. Valued Environmental Components (After Canter, Chawla, & Webster, 2007)

Valued Environmental Components
Air Quality
Airspace Resources
Cultural Resources
Noise Effects
Soil Erosion
Threatened and Endangered Species
Wetlands Resources
Water Resources Management
Facilities
Socioeconomics
Energy
Land Use
Hazardous Materials/Hazardous Wastes
Traffic and Transportation Systems

This guide provides a useful framework for addressing overall impacts in the areas covered by the Valued Environmental Components, and the "quick look" questions make it easy to determine the necessary level of analysis for each of the components. Because the guide focuses on the impact analysis, it does not provide sufficient detail on the procedural requirements, of the implementing guidance for the NEPA regulations.

For this, a project manager will have to turn to one of the many available procedural guides, such as the GSA's NEPA Desk Guide.

C. BEST PRACTICES FOR ENVIRONMENTAL IMPACT STATEMENT MANAGEMENT

In 2002 the Federal Aviation Administration (FAA) updated their best practices guide (Federal Aviation Administration, 2013). The guide is available on their website and outlines best practices in the areas of management techniques, approaches, and actions that can make the environmental process more streamlined and efficient. The FAA guide focuses the best practices into the areas shown in Table 2.

Table 2. FAA Best Practice Focus Areas (After Federal Aviation Administration, 2013)

Best Practice Focus Areas
EIS Project Management
Early Project Planning
Community Consultation
Consultant Selection & Skills
EIS Teams & Teamwork
Scoping an EIS
Interagency & Intra-Agency Coordination
Environmental Processes
Managing EIS Technical Analyses
Use of Technology
Managing Environmental Documents

One of the more informational sections of the FAA guide is the Community Consultation section. Within this section the guide identifies some relatively inexpensive techniques to reduce project cost and schedule risk. These techniques include:

- Establishment of long-term cooperative consultation between the project and the community representatives
- Establishment of a citizens advisory community
- Open and frank dialogue during planning, including possible alternatives

- An effective forum for constructive exchanges on the expected benefits, impacts, alternatives, and mitigation prospects
- Serious consideration of community concerns and views, including project adjustments that have merit and are possible, as well as responses to major community proposals that cannot be accommodated and the reasons why
- Reasonable accessibility to the project manager for responses to community questions and clarification of information.
- A public outreach program
- Informal workshops at periodic points during the planning process

The guide does not provide NEPA regulation implementation guidance, but the lessons learned and risk mitigation statements are useful for the development of the project plan.

D. NEPA AND ENVIRONMENTAL PLANNING: TOOLS, TECHNIQUES, AND APPROACHES FOR PRACTITIONERS

Charles H. Eccleston has written numerous books on environmental planning and NEPA requirements. His book, *NEPA and Environmental Planning: Tools, Techniques, and Approaches for Practitioners* released in 2008 (Eccleston, 2008) is a comprehensive guide to the environmental analysis process. The book covers NEPA and other environmental management requirements, environmental litigation and judicial review, approaches for streamlining the NEPA process, statistics for cost and schedule associated with the NEPA process, risk analysis techniques, and project lessons learned. In his book Eccleston identified that "All too frequently, NEPA is implemented more as a permitting requirement for documenting decisions already made than as a true decision making process." Eccleston also states that "many planning failures can frequently be traced directly to the fact that NEPA has either not been properly integrated with other federal planning processes or not pursued during the early planning phase as required by NEPA regulations." This book is an essential resource for project managers looking for ways to reduce the cost and schedule risks associated with meeting NEPA requirements.

E. EXPLORING NATIONAL ENVIRONMENTAL POLICY ACT PROCESS ACROSS FEDERAL LAND MANAGEMENT AGENCIES

Marc Stern and Michael Mortimer published the paper titled *Exploring National Environmental Policy Act Process across Federal Land Management Agencie*s (Mortimer, 2009) with the intent of answering three basic questions regarding federal agency actions when executing their NEPA processes. The three questions were:

- How do different land management agencies define success of their NEPA processes?
- What lessons for enhancing agency performance in NEPA processes might be applicable between and across these agencies?
- What do agency personnel consider to be the primary strengths and weaknesses of their processes?

In answering these questions through a series of interviews, the authors uncovered a number of inefficiencies in the NEPA processes arising for a lack of agency understanding of the goals of the NEPA legislation and individual perceptions regarding the utility of the process itself.

The authors found that EIS authors did not have a clear picture of the intended audience and for those that understood the public was the intended audience, they did not believe that the NEPA documents were an "effective communication tool" for the public. They also found that both real and the threat of litigation "permeates all aspects of NEPA implementation." They found that litigation had a direct impact on the document's length and inclusion of analysis not directly related to the scope of the project. The authors also found that those charged with developing the NEPA documents treated them primarily as a "hoop to jump through." As Eccleston (Eccleston, 2008) did, the authors determined that the NEPA process was not necessarily connected to the project's decision making process and decisions were made long before the completion of the NEPA process.

The authors question the linkage between NEPA and adaptive management, given that the current interpretation of NEPA requirements push projects to "make predictions with some reasonable degree of certainty, even when adequate information is not available, rather than allowing them to use their expert judgment to adapt and adjust

implementation as necessary to achieve a project's purpose and need." With regard to public outreach, the authors concluded that "even the best public outreach can be foiled by any one entity that wishes to remain outside the process or is determined to sue regardless of agency efforts." While at the same time "enhancing the general publics' perceptions of federal agencies can have many more benefits than merely avoiding litigation."

By using case study and direct interview of past project coordinators, the authors have developed a valuable resource for project managers faced with the task of developing NEPA documentation.

F. LITERATURE REVIEW SUMMARY

The literature review identified several sources of information that are essential references for project cost and schedule risk reduction. Unfortunately, government project managers, by training and habit, typically look only to agency governing documentation for this information. Although the literature review did uncover agency governing documents that adequately covered how to meet the NEPA requirements, little agency data was uncovered that would assist the project manager with the development of a balanced risk approach to the incorporation of NEPA regulation within the project plan. For this, the project manager is forced to turn to privately developed guidance. DoD project managers are trained to execute the project to defined technical project requirements. In the case of environmental impact analysis and planning, these documents identify that meeting the technical requirements may be insufficient given the social complexities associated with the environmental aspect of the program. To reduce project cost and schedule risk, project managers will have to better understand these social complexities and this is best done through case studies, and the study of best practices and lessons learned such as those presented by the FAA, Eccleston, this thesis, and multiple other private sources.

III. DEPARTMENT OF DEFENSE ACTIVITY IN HAWAII

A. OVERVIEW

Federal spending, in particular defense spending, accounts for a significant portion of Hawaii's revenue. The DoD is the second major source of revenue to the state of Hawaii, the first is tourism. Hawaii is the 3rd ranking state in per capita federal defense expenditures, and Pearl Harbor Naval Shipyard is the largest industrial employer in Hawaii. With every major defense contractor represented via local staffing in Hawaii, DoD projects are integral to the economy of the state of Hawaii (The Chamber of Commerce of Hawaii, 2008). There are a number of military installations in the state of Hawaii; ten of the largest from each service are listed in Table 3.

Table 3. State of Hawaii Military Installations

Military Installations
Hickam Air Force Base
Wheeler Army Airfield
Fort Shafter
Pohakuloa Training Area
Schofield Barracks
Tripler Army Medical Center
Coast Guard Integrated Support Command
Marine Corps Base Hawaii
Barking Sands Missile Range
Naval Station Pearl Harbor

The military also has a significant footprint on the islands, with Oahu having the largest footprint with just over 20% of the island dedicated to the military. In total, the military controls roughly 1.1 million acres of land. Figure 2. shows the land that is currently used by the military.

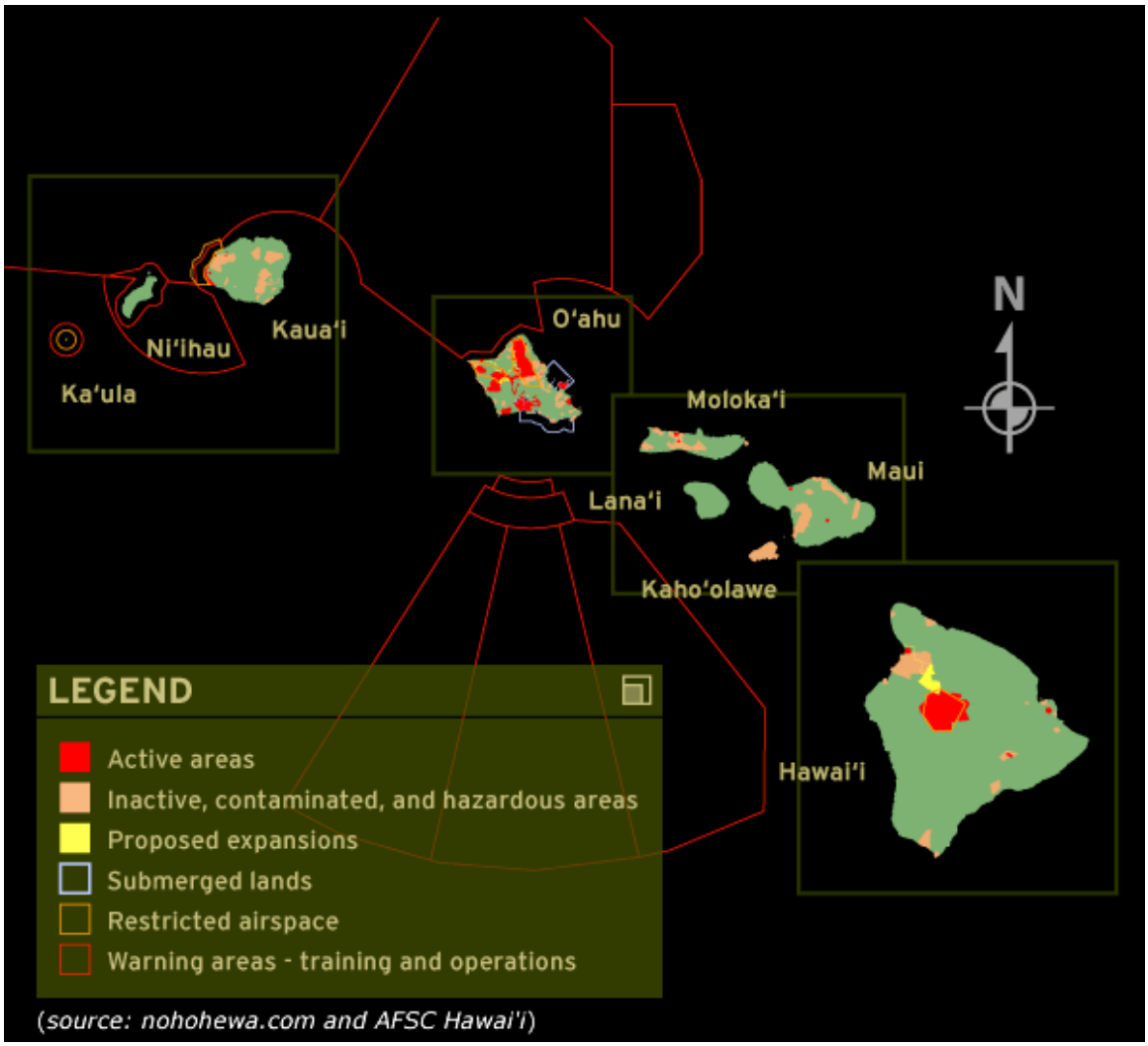

Figure 2. Military Land Use in the State of Hawaii (From Webb, 2012)

In a November 10, 2011, speech by Secretary of State Hillary Clinton (Clinton, 2011) at the East-West Center Honolulu, Hawaii, Clinton addressed several of her points in the U.S. foreign policy article, "America's Pacific Century," which announced the U.S. "pivot" toward Asia, the Pacific and the strategically important Indian Ocean. Specifically, Clinton stated that "It is becoming increasingly clear that in the 21st century, the world's strategic and economic center of gravity will be the Asia Pacific, from the Indian subcontinent to the western shores of the Americas. And one of the most important tasks of American statecraft over the next decades will be to lock in a

substantially increased investment—diplomatic, economic, strategic, and otherwise—in this region." Clinton called Hawaii "America's gateway to Asia" and noted that one of the six key lines of strategic refocusing action is "forging a broad-based military presence." It is no secret that the United States is executing a strategic shift in focus to the Asia-Pacific region, and it is also no secret that this shift includes a broad shift in military investment strategy. With Hawaii being the "gateway to Asia" for the U.S., one should expect an increased military presence and revenue stream for the state of Hawaii.

This expectation for increased revenue was met with the Fiscal Year 2013 Appropriations package. According to the Fiscal Year 2013 Military Construction and Veterans Affairs and Homeland Security Appropriations bills, the federal government is poised to allocate $366 million for military construction in the State of Hawaii alone. In a time when the federal government and DoD are trying to cut back, this clearly signals the commitment to "America's Pacific Century."

Table 4. FY 2013 Military Appropriation Construction Hawaii (After Office of Senator Daniel K. Inouye, 2012)

Army	
POHAKULOA TRAINING AREA	
Automated Infantry Platoon Battle Course	$29 million
SCHOFIELD BARRACKS	
Barracks	$41 million
Barracks	$55 million
WHEELER ARMY AIR FIELD	
Combat Aviation Brigade Barracks	$85 million
Army National Guard	
KAPOLEI	
Army Aviation Support Facility Ph1	$28 million
Navy	
KANEOHE BAY (MARINE CORPS BASE HAWAII)	
Aircraft Staging Area	$14.68 million
MV-22 Hangar and Infrastructure	$82.63 million
Air National Guard	
JOINT BASE PEARL HARBOR-HICKAM	
TFI - F-22 Combat Apron Addition	$6.5 million
Special Operations Command	
JOINT BASE PEARL HARBOR-HICKAM	
SOF SDVT-1 Waterfront Operations Facility	$24.289 million
HAWAII Total:	$366.099 million

Each of these projects will require at a minimum an environmental impact statement and if they meet one of the triggers discussed in section IV.E, Hawaii Environmental Policy Act Distinction, they will have to produce an EA as well as comply with the requirements outlined in the HEPA. Environmental analysis, and the

documentation and communication of that analysis can have serious cost and schedule impacts on these and future infrastructure projects in the State of Hawaii. Current trends indicate that the voting public and courts are becoming greater contributors to project decisions. Because of the increased attention from the public and the courts, it is imperative that the Defense Department Project Managers operating in the state of Hawaii have a thorough understanding of both NEPA and HEPA regulations as well as an understanding of the Hawaiian culture and associated views of the environment and projects that impact that environment.

B. BIO-FUEL PROJECT

A potential future DoD infrastructure project that is not documented in the Fiscal Year 2013 Authorization bill but deserves special attention is bio-fuel production and transportation. This emerging new technology is well aligned with the Navy's strategic objectives and has the potential to impact Hawaii's economy and environment.

According to the fact sheet published by the American Security Project (Cunningham, 2013), the DoD is the largest single consumer of energy in America, consuming 117 million barrels of oil in FY 2011. The Navy, second in consumption requirements to the Air Force, accounts for roughly 28% of the department's fuel use. This reliance on oil adds risk to the protection of our nation, as every 25-cent increase in the cost of a gallon of fuel costs the DoD an additional one billion dollars per year. Each of the services has differing plans to reduce their fuel dependence and associated risk. The Navy has set a goal to obtain 50% of the fleet's liquid fuel from alternative sources by the year 2020, and to deploy a "Great Green Fleet" to demonstrate operational capability by 2016 (Office of the Secretary of the Navy, 2013). The Navy plans to meet its goals by partnering with industry and other government agencies to invest in domestically produced biofuels.

In 2011, the Defense Logistics Agency procured 450,000 gallons of biofuel from Dynamic Fuels and Solazyme Corporation (Solazyme, 2011). This fuel was used by the Navy in a 50/50 mixture to power their ships and aircraft during the 2012 Rim of the Pacific exercise off the coast of the Hawaiian Islands.

This movement to biofuels is important to the islands of Hawaii for two reasons. The first reason is because of the amount of fuel that flows through Naval Station Pearl Harbor. Pearl Harbor is homeport for 30 U.S. Navy Ships (U.S. Navy, 2013), significant number of aircraft, and is often called on to service and to replenish visiting vessels. With destroyers burning roughly 200 gallons of fuel per operating hour (O'Rourke, 2006), this creates a significant fuel requirement for the Naval Shipyard. The second reason is the Office of Naval Research and the U.S. Department of Agriculture are currently conducting an experiment with 35,000 acres of Maui soil, on the Hawaiian Commercial & Sugar plantation, to determine whether Maui's mixture of nutrient rich soil, tropical sun, high rainfall, and native plants can produce the Navy's fuel of the future (Shachtman, 2013). With the Navy planning to invest more than half a billion dollars into its biofuel program, success on the island of Maui could increase the Defense Department's contribution to Hawaii's economy while supporting the research and infrastructure development that is required for the state of Hawaii to continue to transition their power generating facilities to biofuels.

If the Navy decides to invest in infrastructure and fuel production in Hawaii, there will be significant environmental analyses to be conducted, and because this project would be federally funded and use a significant amount of Hawaiian land, the project would be subject to NEPA and HEPA regulations. Major infrastructure projects on the Hawaiian Islands have a history of significant public scrutiny and long and expensive legal action. For a project such as this to be successful, the Defense Department and the State of Hawaii would do well to understand and sidestep the pitfalls encountered by other recent infrastructure projects in the state of Hawaii.

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IV. ENVIRONMENTAL IMPACT STATEMENT

A. ORIGIN

Until 1969 the national philosophy regarding environmental impacts due to the construction and utilization of infrastructure was to not worry about it during the planning stages, build it, and then after the work was completed and negative effects were realized, either attribute the ill effects to the cost of progress or attempt to implement mitigations after the fact. This philosophy allowed a number of federally funded major infrastructure projects to cause significant unrepairable harm to the environment. To change this philosophy, the U.S. Congress enacted The National Environmental Policy Act of 1969. This act essentially mandated that environmental effects will be understood and considered during project planning (Bregman, 1999).

B. PURPOSE

The purpose of the NEPA is to cause project managers to think about the environmental impacts early in the project's lifecycle. NEPA by default forces project managers to add environmental impacts as a primary factor to the projects' Analysis of Alternatives (AoA) during the early planning stages. For DoD projects that are following the Defense Acquisition University (DAU) Systems Engineering Process, this consideration for environmental factors begins prior to Milestone A, during the AoA scoping and development processes. During the AoA, environmental impacts are considered alongside cost, schedule, and quality. Adding the environmental factor to the AoA may give rise to a solution that presents lessor impact to the environment or that contains environmental mitigation measures as part of the project plan at a cost to the other three primary factors.

C. POLICY

The National Environmental Policy Act of 1969 was signed into law by President Richard Nixon on 1 January 1970. NEPA was enacted to declare a "national policy which

will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality" (National Environmental Policy Act of 1969, 1970). The NEPA was enacted to inform stakeholders, to include the public, of the environmental impact, impact mitigation measures, to include the cost and schedule impacts of implementing those measures, and alternatives to the proposed projects. The NEPA does not prohibit federal projects from harming the environment; however there is a growing list of legislation that does, such as the Endangered Species Act, The Clean Air Act, The Clean Water Act, etc.

For the study of the cost and schedule risks associated with the EIS, Title I Sections 101 and 102, and the establishment of the Council on Environmental Quality in Title II are of particular importance. The Act in its entirety can be found in the appendix.

1. Title I: Congressional Declaration of National Environmental Policy Section 101

Section 101 of the act establishes the responsibility of the Federal Government to use "all practical means and measures" to "foster and promote general welfare." In doing so, the act establishes the broad requirement for the Federal Government to be mindful of environmental impact. Specifically the act states:

> (A) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature

can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(B) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;

5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(C) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment. (National Environmental Policy Act of 1969, 1970)

2. Title I: Congressional Declaration of National Environmental Policy Section 102

Section 102 establishes how the Federal Government will meet the requirements established in Section 101.

The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

> (A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment;
>
> (B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations; (National Environmental Policy Act of 1969, 1970)

Of particular importance to the study of the EIS, Section 102.C established the requirement to produce a report detailing the proposed projects environmental impacts. This statement is known as the Environmental Impact Statement.

> (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --
>
> (i) the environmental impact of the proposed action,
>
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
>
> (iii) alternatives to the proposed action,
>
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
>
> (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. (National Environmental Policy Act of 1969, 1970)

In implementation, the requirement to prepare an EIS was reserved for “major Federal actions” however it is important to note that since 1970, “major Federal actions” has been expanded to include projects that the federal government has allocated funds to or has regulatory influence over, which includes all infrastructure projects executed by the DoD.

3. Title II: Council on Environmental Quality

Title II establishes the Council on Environmental Quality. The act establishes this council and its Chair as the advisor to the President for environmental matters, and as importantly, this act authorizes the Council to develop the "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" (Council on Environmental Quality, 1978). These regulations are what establish the process for environmental analysis and the required contents of the EIS.

D. REGULATIONS FOR IMPLEMENTING THE PROCEDURAL PROVISIONS OF THE NATIONAL ENVIRONMENTAL POLICY ACT

In 1978 the Council on Environmental Quality published the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. Part 1502 of these regulations define the Environmental Impact Statement and its content requirements. The regulations identify the purpose of the EIS as, "to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the federal government." The policy further states that the EIS "shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment" Finally, the policy states that the EIS "shall be used by federal officials in conjunction with other relevant material to plan actions and make decision" (Council on Environmental Quality, 1978).

Section 1502 then outlines the complete requirement set for the EIS as shown in Table 5.

Table 5. EIS Requirements (After Council on Environmental Quality, 1978)

Section	Title
1502.1	Purpose
1502.2	Implementation
1502.3	Statutory requirements for statements
1502.4	Major federal actions requiring the preparation of environmental impact statements
1502.5	Timing
1502.6	Interdisciplinary preparation
1502.7	Page limits
1502.8	Writing
1502.9	Draft, final, and supplemental statements
1502.1	Recommended format
1502.11	Cover sheet
1502.12	Summary
1502.13	Purpose and need
1502.14	Alternatives including the proposed action
1502.15	Affected environment
1502.16	Environmental consequences
1502.17	List of preparers
1502.18	Appendix
1502.19	Circulation of the environmental impact statement
1502.20	Tiering
1502.21	Incorporation by reference
1502.22	Incomplete or unavailable information
1502.23	Cost-benefit analysis
1502.24	Methodology and scientific accuracy
1502.25	Environmental review and consultation requirements

1. Primary Areas of Consideration

Within the EIS requirements, the most substantial sections are Sections 1502.14 and 1502.16. Section 1502.14 identifies the agency requirement to:

> (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
>
> (b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
>
> (c) Include reasonable alternatives not within the jurisdiction of the lead agency.
>
> (d) Include the alternative of no action.
>
> (e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.
>
> (f) Include appropriate mitigation measures not already included in the proposed action or alternatives. (Council on Environmental Quality, 1978)

Section 1502.16 identifies the agency requirement to include a discussion on "the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented."

The Council of Environmental Quality has developed an extensive set of requirements and guidelines for projects to follow when planning and conducting environmental analysis and decision review. However, even when a project develops a plan to address each of the requirements, various interpretations of these requirements can lead to lawsuits, litigation, and resulting project cost and schedule delays. Within the

requirements listed in 1502.14 the interpretation of the terms rigorously, objectively, reasonable, substantial, and appropriate are often the center of these lawsuits

E. HAWAII ENVIRONMENTAL POLICY ACT DISTINCTION

Several states to include the state of Hawaii have passed their own environmental impact statement legislation. This legislation is passed to refine the regulations as outlined in the NEPA and to provide a process for environmental review of non-federally funded projects.

The Hawaii Environmental Policy Act, fashioned after the NEPA, was signed into Hawaiian law in 1974. The HEPA includes the statutes and administrative rules found in Hawaii Revised Statute (HRS) Chapter 343, Environmental Impact Statements; Hawaii Administrative Rule 11-200, Environmental Impact Statement Rules; and Hawaii Administrative Rule 11-201, Environmental Council Rules of Practice and Procedure (State of Hawaii Office of Environmental Quality Control, 2012). Although the HEPA is fashioned after the NEPA, the HEPA differs from the NEPA in three distinct ways which are shown in Table 6.

Table 6. HEPA vs. NEPA (After State of Hawaii Office of Environmental Quality Control, 2012)

HEPA	**NEPA**
Separates disclosures from the permitting and implementation processes	Constitutes a process that is under the oversight of one federal agency from start to finish
Draws a distinct boundary between the disclosure process and the implementation or permitting process	Does not draw a distinct boundary between the disclosure process and the implementation or permitting process
Reviews triggered by any of nine factors	Reviews triggered by major federal action significantly affecting human environment

The most substantial of the differences is that the State requirements can be applicable to projects that are not State funded, if it meets one of the nine trigger factors. The nine factors that trigger reviews along with the responsible agency are found in Table 7. For additional guidance to include exclusions refer to the State of Hawaii Office of Environmental Quality Control's HEPA implementation guide (State of Hawaii Office of Environmental Quality Control, 2012).

Table 7. HEPA Triggers (After State of Hawaii Office of Environmental Quality Control, 2012)

Trigger		**Responsible Agency**
1	Use of state or county lands or funds	Agency that is using funds or holds land title
2	Use of land classified as a conservation district	Department of Land and Natural Resources
3	Use of land within a shoreline	County planning department
4	Use of land within a historical site	County planning department
5	Use of land within the Waikiki area	City and county of Honolulu
6	Amendments to existing county general plans where the amendment would result in designations other than agriculture, conservation or prevention	County planning department
7	Any reclassification of land classified as a conservation district	Land Use Commission
8	Construction or modification of helicopter facilities that affect lands classified as a conservative district, a shoreline area, or a historic site	County planning department
9	Proposal of a Wastewater treatment, Waste to energy facility, Landfill, Oil refinery, or Power generating facility	State or county government agency that issued discretionary approval

Since all DoD projects utilize federal funds, they are required to comply with NEPA. If the project meets one of the nine factors shown in Table 7. then it will also be subject to HEPA requirements. The majority of the requirements are common between the HEPA and the NEPA and to reduce the burden of executing two processes Section 343-5(f) of the HRS states that "whenever an action is subject to both the National Environmental Policy Act of 1969…. And the requirements of [Chapter 343, HRS] the agencies shall cooperate with federal agencies to the fullest extent possible" (State of Hawaii Office of Environmental Quality Control, 2012). In addition, the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act states that "Agencies shall cooperate with state and local agencies to the fullest extent possible to reduce duplication between NEPA and state and local requirements, unless the agencies are specifically barred from doing so by some other law" (Council on Environmental Quality, 1978). With regard to the EIS, when comparing the specific requirements of the EIS as defined by the U.S. Council of Environmental Quality and the Hawaii Office of Environmental Quality Control, there are no substantive differences. Table 8. compares the primary requirements as found in the Hawaiian and Federal guidance.

Table 8. State and Federal EIS Content (After: Council on Environmental Quality, 1978 and State of Hawaii Office of Environmental Quality Control, 2012)

Hawaii	**Federal**
Concise summary and table of contents	Summary and table of contents
Statement of purpose for the project	Discussion on the purpose of and need for action
Detailed project description including maps, technical data, economic and cultural effects and historical perspective	Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
Analysis of alternatives to the proposed project and an explanation why the alternatives were rejected	Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
Description of the environmental setting	Discussion of affected environment
Statement of the relationship of the proposed action to land use plans, policies and controls for the affected area	Possible conflicts between the proposed action and the objectives of federal, regional, state, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned
Description of the probable impacts of the project including the direct, indirect and cumulative impacts, as well as impacts on both the natural and human environments	Discussion of the Direct, indirect, and cumulative impacts
Description of the relationship between short-term uses of environmental resources and long-term productivity (sustainability analysis)	Discussion of the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity
A statement of the unavoidable environmental impacts caused by the project and a rationale for proceeding with the project in light of these impacts	Discussion will include the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented
A consideration of all mitigation measures proposed to avoid, minimize, rectify, or reduce the project's adverse impacts	Means to mitigate adverse environmental impacts
A summary of unresolved issues and a discussion of how such issues will be resolved	Not Specified
Listing of all agencies, organizations and individuals consulted during the preparation of the document	List of preparers
Reproduction of all substantive comments received during the study process and the responses to those comments	All substantive comments received on the draft statement should be attached to the final statement

Although the content requirements for the EIS are similar, there is a procedural difference when executing the Federal and State processes. When executing both processes, the State requires that the project develop a final EA even if it is believed that the action will require an EIS. The substantive requirements for the EA are similar to that of the EIS while scoped at a level of detail, and finality commensurate with the early project phase. The requirements for the EA are shown in Table 9.

Table 9. EA Substantive Content (After State of Hawaii Office of Environmental Quality Control, 2012)

EA Substantive Content
Agencies, citizens groups, and Individuals consulted in the early stages
Proposed action with respect to its technical, economic, social and environmental characteristics
Description of affected environment
Discussion of the direct, indirect, and cumulative impacts
Measures to mitigate direct, indirect, and cumulative impacts
Determination based upon analysis of significance
Rationale for determination
Agencies to be consulted in preparation of the EIS
Required permits and approval
Written comments from early comment period

Hawaii's process is constructed to allow for a comment period following the release of a draft EA and then a final EA that addresses the comments. In the case where both NEPA and HEPA regulations apply, the agency can forgo the development of a draft EA and submit the final EA for the 30-day public comment period. Then the agency can follow with the draft EIS which addresses the comments in the final EA, provide a 45-day comment period for the draft EIS in accordance with HEPA and NEPA, and then issue the final EIS. There is no official comment period for the final EIS specified for

either the HEPA or NEPA implementing instructions, but substantive comments based upon new information received during the 30-day waiting period may require a supplement to the final EIS.

F. DEPARTMENT OF DEFENSE GUIDANCE

The DoD has also developed guidance for the implementation of NEPA requirements into the project management plan. This guidance is available from DAU and is contained within the Environmental Safety and Occupational Health subject area. As with the other implementation guidance, the DoD guidance stresses the need to start early. "It is important to initiate NEPA planning as early in the acquisition process as possible to ensure resulting analyses are an integral component of the systems engineering process. Early planning can prevent unexpected issues during the lifecycle of the project" (Defense Acquisition University, 2013). For DoD projects this means starting prior to Milestone A as shown in Figure 3.

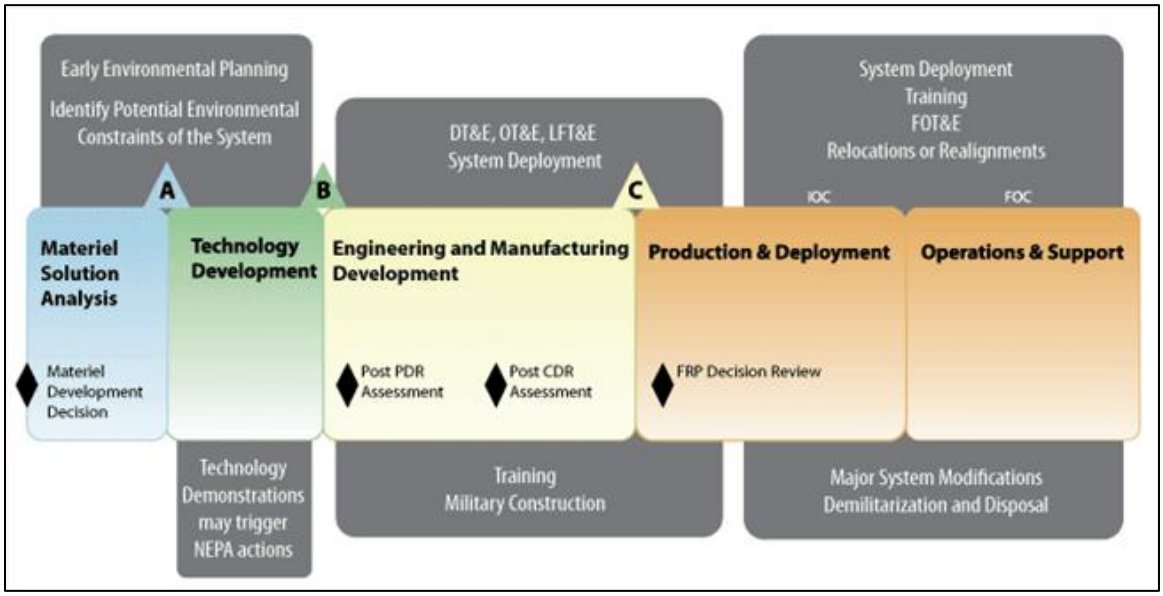

Figure 3. NEPA and Defense Acquisition Timeline (From Defense Acquisition University, 2013)

In addition to starting early, the DoD guidance identifies the need to continue to revise the NEPA analysis through the engineering, manufacturing, and development phase, and the need for the environmental impact to be an element in the alternative decisions. “Beginning with the materiel solution analysis and technology development during pre-systems acquisition activities and continuing with engineering and manufacturing development, decisions are continually being made which impact the characteristics of the system. NEPA requires that the evaluation of environmental effects of the proposed action and reasonable alternatives be completed before decisions are made that would prejudice selection of an alternative to the proposed action” (Defense Acquisition University, 2013). To ensure that the costs associated with appropriate environmental review are understood and included within the program plan, the DoD requires that NEPA requirements be included in the Program Objective Memorandum. “An essential action of the PM is to ensure NEPA requirements are integrated into the Program Objective Memorandum (POM) building process, a source of allocating adequate funding to support NEPA analysis, documentation, and mitigation” (Defense Acquisition University, 2013).

DAU also provides a NEPA analysis and documentation guide which is summarized in Figure 4. This guide provides the basic requirements associated with EA and EIS preparation. The guidance is not sufficient to support detailed environmental analysis planning. For more specific guidance, program managers would need to refer to the Council on Environmental Quality’s Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.

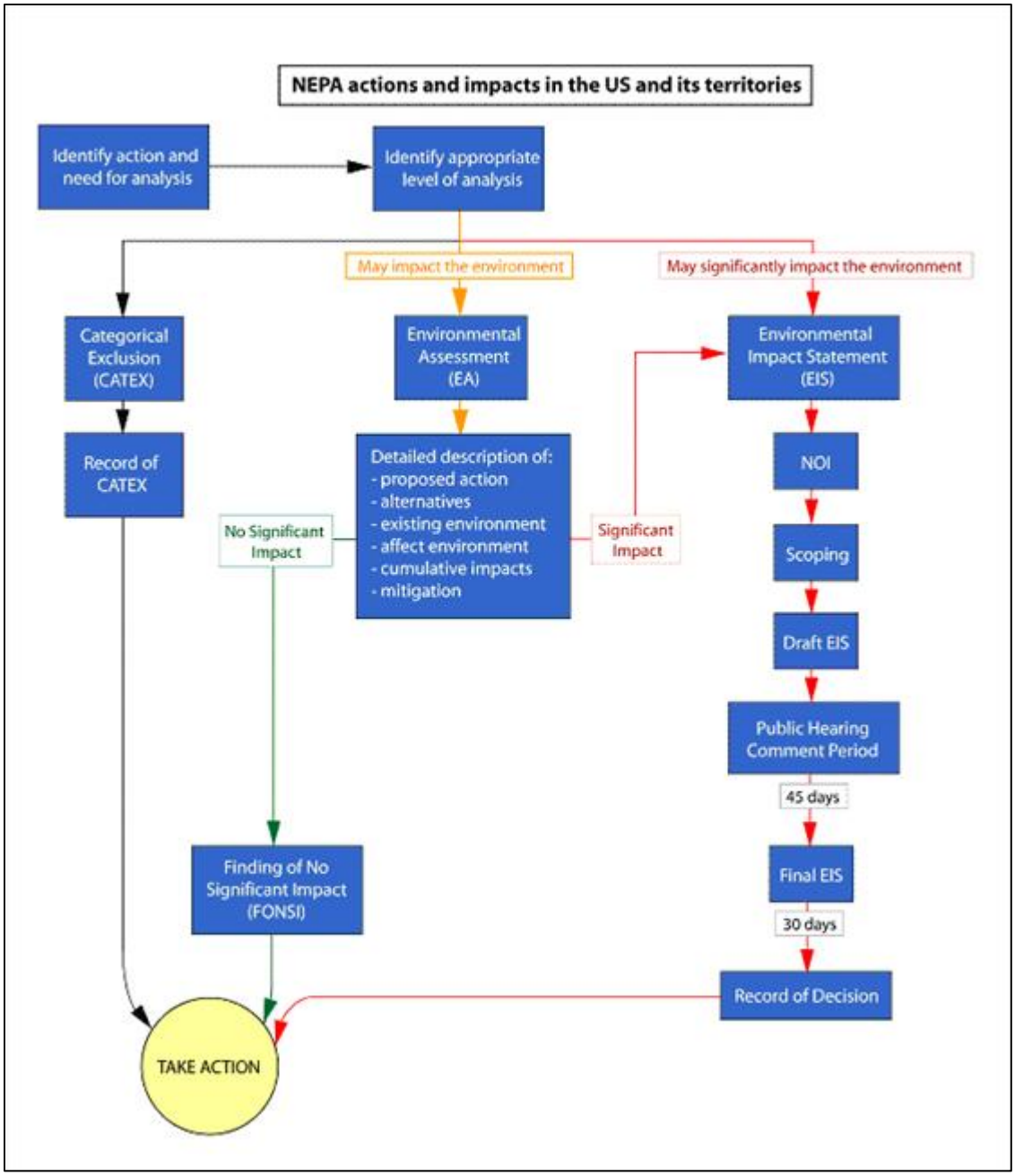

Figure 4. NEPA Analysis and Documentation Guidance (From Defense Acquisition University, 2013)

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V. CASE STUDIES

A. HONOLULU RAIL TRANSIT

1. Project Background

The United States Department of Transportation Federal Transit Administration (FTA) and the City and County of Honolulu Department of Transportation Services (DTS) are executing a project that is envisioned to provide public transit service on the island of Oahu. The project is planned to connect the east and west of the southern part of the island, extending from Kapolei to the University of Hawaii at Manoa and Waikiki. As you can see from Figure 5. Oahu automobile registrations have tracked fairly well to the population, nearly doubling between 1960 and 2010. Vehicle miles driven, on the other hand, have increased by a factor of five in the same period.

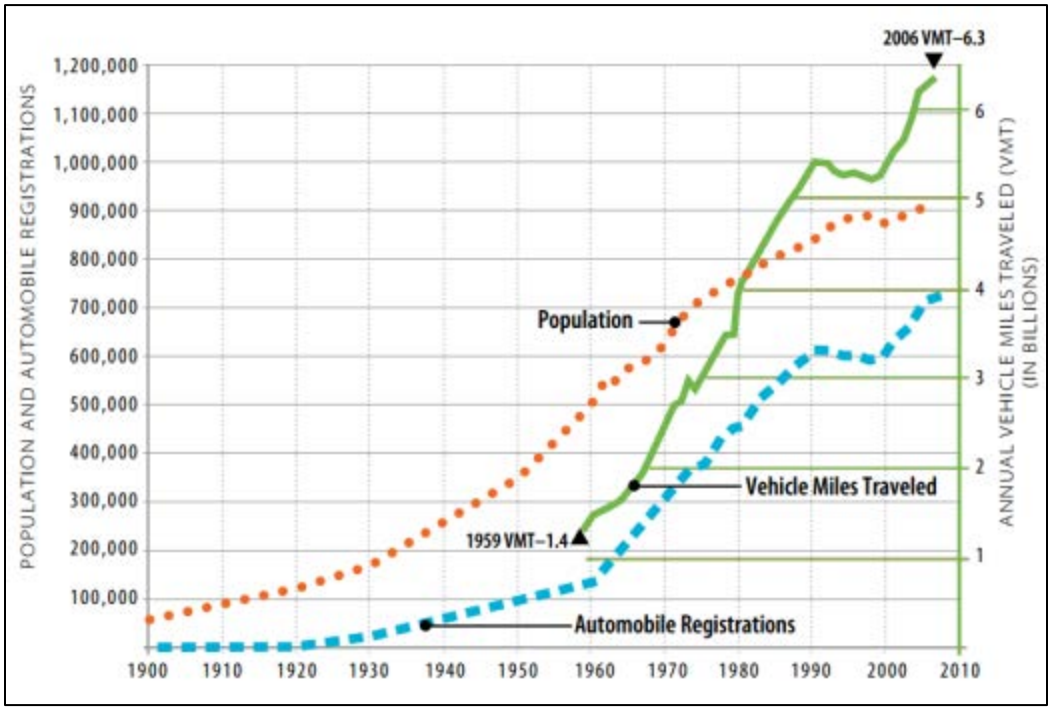

Figure 5. Population, Vehicle Ownership, and Vehicle Miles Traveled on Oahu (From U.S DOT FTA and City and County of Honolulu DTS, 2010).

This increase in vehicle and road use has earned Honolulu the honor of being the city with the worst traffic in America (Gorzelany, 2012). The increase in demand was initially met through the development of the H-1 freeway in the 1950s, but by the 1960s, public opposition to the expansion of the freeway system combined with lack of funds, and environmental impacts forced the abandonment of an elevated Makai freeway between Kalihi and Mōʻiliʻili (U.S DOT FTA and City and County of Honolulu DTS, 2010).

In 1967, an island wide transportation study found that a fixed guideway transit system could provide low-cost transportation to meet increasing transportation demands. In the early 1970s, the Preliminary Engineering and Evaluation Program (PEEP) phase-one and phase-two studies further evaluated the fixed guideway transit option. These studies lead the city and county of Honolulu to start the Honolulu Area Rail Rapid Transit (HART) project which aimed at providing service between Pearl City and Hawaii Kai.

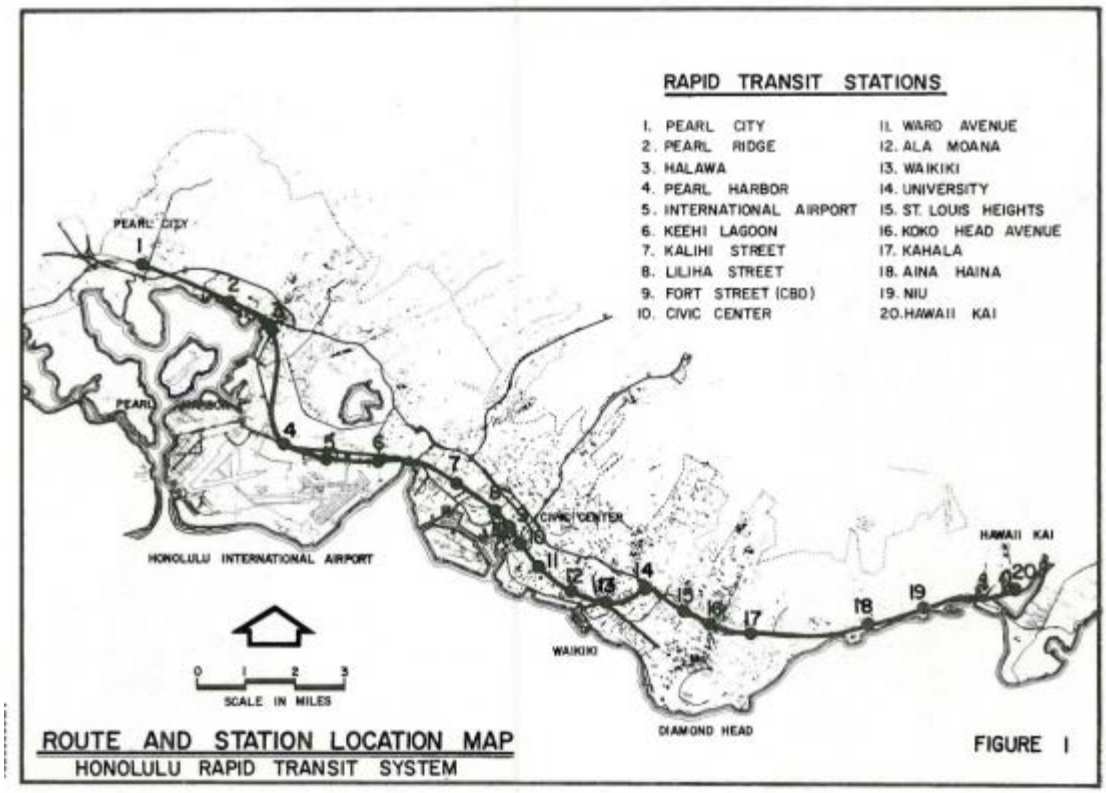

Figure 6. HART Project Route and Station Map (From Daniel Mann, Johnson & Mendenhall, 1974)

In the early 1980s, after changes in administration and priorities at both the local and federal level, the project was stopped. In the mid-1980s, the project was restarted under the name Honolulu Rapid Transit Development. The project started where the HART project left off and added some new automation techniques to the solution. This project was halted in 1992 because the Honolulu City Council voted down the measure that would have generated the project's needed funds through a general exercise tax. In 1998, the city looked into a lower cost and impact approach that would have made use of existing infrastructure. This project was called the Trans 2K Islandwide Mobility Concept Plan. The project completed a draft EIS in 2000 and some of the project's facilities were completed, but the project was abandoned shortly after Honolulu Mayor Mufi Hannemann won the election in 2004. Under Mayor Hannemann, the rail project was

once again resurrected as the Honolulu High-Capacity Transit Corridor Project (HHCTCP). By 2005, with traffic significantly worse than in 1992, the Honolulu City Council supported a general exercise tax to fund the transit project. In 2005, the DTS published a notice of intent to publish a draft EIS.

Upon completion of the analysis of alternatives, the Honolulu City Council selected the fixed guideway option as the locally preferred alternative. The draft EIS was published in November of 2008 and the Final EIS followed in June of 2010. On 19 December 2013, the Full Funding Grant Agreement for the HHCTCP currently referred to as the Honolulu Rail Transit Project (HRTP) was awarded by the FTA and was executed by the city and county of Honolulu.

2. Project Summary

According to the Honolulu Rail Transit Project Overview (HART, 2012), the HRTP is a 20 mile elevated rail line with 21 stations that will connect West Oahu with downtown Honolulu and Ala Moana Center via Honolulu International Airport, shown in Figure 7. , with potential future expansions to other parts of West Oahu, Salt Lake, UH Manoa, and Waikiki. The transit system will feature steel wheeled trains each carrying hundreds of passengers. It is anticipated that by 2030 the system will make over 100,000 trips per day and take roughly 40,000 vehicles off the road. The project is anticipated to provide over 10,000 jobs per year for rail construction.

Figure 7. Honolulu Rail Transit Project Map (From HART, 2012)

3. Litigation

The groundbreaking for the project was planned for the fourth quarter of calendar year 2009 but was pushed back multiple times until the first quarter of calendar year 2011 due to delays in the project review process, federal permitting, and approval of the EIS.

On December 27, 2005 the FTA published a Notice Of Intent (NOI) to prepare an Analysis of Alternatives and an Environmental Impact Statement. In this process the city reviewed four alternatives, and concluded that the fixed guideway alternative was the only alternative that met the project's need. The FTA then published a second NOI to prepare an EIS on 15 March 2007. Following nearly a year of public comment, in February 2008, the city council approved the steel on steel alternative which voters supported as demonstrated by their approval of a city charter establishing the steel on steel system. The city then prepared a draft and Final EIS (FEIS) which were released in November of 2008 and June of 2010 respectively. Five years after the initial NOI was filed, the FTA issued a Record of Decision (ROD) approving the project in January of 2011.

In May of 2011 a federal suit was filed alleging that on 23 counts the FEIS and ROD approving the project did not comply with the requirements of NEPA, Section 4(f) of the Department of Transportation Act, the National Historic Prevention Act (NHPA), and the regulations implementing the acts. The Plaintiffs claimed that FTA violated NEPA by: failing to properly define the scope of the project thus "unduly" restricting the scope of the NEPA analysis, failing to properly evaluate all alternatives and associated environmental impacts, and considering only a subset of the heavy rail alternatives. The Plaintiffs also claimed that the FTA failed to meet the requirements of HEPA by: failing to identify and evaluate the use of Hawaiian burial and cultural properties, evaluating the use of HEPA resources in an "arbitrary and capricious fashion", and illegally approving the project with the availability of feasible alternatives and measures that would minimize harm to HEPA protected resources. Finally the Plaintiffs claimed that the FTA failed to meet NHPA requirements by not fully evaluating Hawaiian burial and cultural properties prior to approval (Honolulutraffic.com vs. FTA; Plaintiffs' Opposition to Defendants' Motion for Judgment on the Pleadings, 2011).

In November of 2012 the court ruled in favor of the Plaintiffs on three of the 23 counts finding that the FTA: "arbitrarily and capriciously failed to complete reasonable efforts to identify above-ground TCPs prior to issuing the ROD", failed to adequately "consider the Beretania Street Tunnel alternative prior to eliminating it as imprudent", and failed to adequately "consider whether the Project will constructively use Mother Waldron Park" (Honolulutraffic.com et all vs. FTA; Order on Cross-Motions, 2012). The ruling required the project to go back and rework some of the details of the alternatives analysis, but because it only impacted phase 4 of the project, allowing work on phases 1-3 to continue as scheduled while the analysis is conducted.

While this case was proceeding, the state of Hawaii, city of Honolulu and county of Honolulu were in the Hawaiian Supreme Court defending their decision to approve the rail project with the intent of conducting archaeological inventory surveys prior to commencing work on each project phase instead of conducting the survey against the project as a whole prior to project approval. In the case of Paulette Kaanohiokalani

Kaleikini vs. the state of Hawaii, city of Honolulu and county of Honolulu (Paulette Kaanohiokalani Kaleikini vs. Wayne Yoshioka, 2012) the plaintiff alleged that the defendants violated Hawaii Revised Statutes chapters 6E, 343, and 205A by not completing an archaeological inventory survey for the entire project prior to project approval, and thus "foreclosing" later phase options that might have a lesser impact. In August of 2011 the Circuit Court of the First Circuit granted summary judgment in the favor of the defendants, but in 2012 the Superior Court found in favor of the Plaintiff on counts one through four, specifically finding that the defendants did not comply with the rules implementing Hawaii Revised Statutes chapters 6E-8 and 6E-42, while they did comply with HEPA and land use statutes. This ruling effectively stopped construction until the studies could be completed, costing the five billion project an estimated 114 million dollars (Pacific Business News, 2012). Taking the planned $107 million dollar budget for EIS development and adding the $114 million dollar cost for delays and analysis as a result of the archeological ruling, barring additional litigation, the project has spent roughly 5% of the budget on the EIS and in meeting land use requirements.

4. Current Status

As of January 2013, the project continued design, planning and engineering for all phases, the FTA and city of Honolulu signed a 1.5 billion dollar funding agreement in December of 2012, and the project was reporting that the archaeological work was ahead of schedule. Project completion was scheduled for initial operation in 2016 and full operation in 2019.

5. Lessons Learned

With a price tag of over five billion dollars, the rail project is a significant undertaking for the state of Hawaii and county of Honolulu. Reviewing project documentation which is well organized and publicly available via the Honolulu Rail Transit website (Honolulu Authority for Rapid Transportation, 2013) it is clear that a significant amount of effort went into the planning for compliance to environmental and

land use regulations. Even with the level of planning commensurate with a five billion dollar plus project, construction in support of the rail project, as of January 2013, was at a standstill. The project made a valid attempt to allow for and address public comments, providing over a year for public comment on the draft EIS. The project also executed a significant communication strategy via newsletters, town-hall meetings, public presentations, and a well-designed website.

These efforts were successful in shaping public opinion as evidenced by the approval of a general excise tax to fund the project, and the result of the 2008 ballot measure asking the voters whether the city should have the authority to conduct a steel-on-steel transit system. Unfortunately, following the 2008 approval, the rail project has not done enough to engage the public. In support of the EIS development phase between 2009 and 2010, the project spent roughly $1 million per year on public outreach for items such as those shown in Table 10.

Table 10. Project Outreach Activities (After Kalani, 2010)

Outreach Activities
Neighborhood board meetings
Community presentations
Community workshops
Monthly newsletters
Color brochures
Radio spots, including a weekly talk show
Newspapers adds
Hotline Staffing
Question answering via email and web
Monthly television show
Public hearings
Project DVD with an animated fly-over

$2 million may sound like a sizable amount of funding for public outreach; however, for a project with a $108 million budget for EIS development, $2 million only accounts for roughly 2% of the budget, which by most estimates is low. Compare this to the 12%

spent by an 18 mile commuter rail project in Denver, which according to the Denver Regional Transportation District, is on the low end of their 10-20% spectrum (Kalani, 2010). Regardless of the percentage spent, it is clear that the Honolulu project should have invested more in its public outreach program. With construction delays costing the program tens of millions, the risk analysis should have identified the need to invest this money in communication vice litigation and construction delays.

Another lesson learned is that all documented options within the analysis of alternatives should be equally evaluated to avoid the later claim that one or more options were not as carefully evaluated. This project demonstrates that the courts have assumed the responsibility for determining the appropriateness of project planning efforts based not upon the project planning efforts themselves but on the testimony of each side. In this case, the court did not feel that appropriate or reasonable consideration was given to all of the alternatives. Unfortunately for project managers, allowing lawyers and judges to make this determination may force the project into incurring additional expense to fully consider options that could otherwise be dismissed through preliminary analysis.

NEPA and HEPA requirements also provide the platform for the public to question the adherence to other Hawaiian Statutes. As was demonstrated by the Hawaiian Supreme Court ruling, land use analysis of all project phases should be completed prior to the start of construction. To reduce schedule for large infrastructure projects, it is often advantageous to award contracts and begin construction on one phase while the planning for another phase is ongoing. This ruling, however, demonstrates that if construction on one phase has the potential to limit more environmentally friendly options for another phase, it can be argued that the environmental analysis has to be completed for the entire project before any construction can commence.

The final lesson learned, a common one, is if those that do not agree with your project for any reason, environmental or otherwise have sufficient resources, they will interfere with your project via environmental compliance. Project managers should account for this risk in both their budgets and planning timelines.

B. HAWAII SUPERFERRY

1. Project Background

In 2003, founders Timothy Dick, John Garibaldi, and Robert White announced plans to develop a daily high-speed ferry route between Honolulu on Oahu, Nawiliwili on Kauai, and Kahului on Maui. In 2004 the company entered into negotiation with the state Department of Transportation with a plan to begin service in 2007. In April of 2004 the United States House of Representatives passed a $275 billion highway bill that included $62 million for ferry service in Hawaii and Alaska.

Figure 8. Hawaii Superferry (From Paiva, 2008)

In October of 2004, the state's plan to add dock and shipping facilities within Kahului Harbor met opposition from the surfing and canoe paddling community. In February of 2005, environmental interest groups joined forces with Kaua'i County Council, Maui's Mayor, and shipping company officials to push for an EIS. At the same time, a Senate bill mandating an EIS was making it through the legislative process. The senate bill was killed in March of 2005, and in July of 2005 Maui Circuit Court Judge Joseph E. Cardoza dismissed the case brought by the Sierra Club, Maui Tomorrow, and

the Kahului Harbor Coalition demanding an EIS, noting that the groups had no standing to bring the lawsuit and that the Hawaii Department of Transportation had properly followed environmental law (Honolulu Advertiser Staff, 2007). The case was then brought to United States District Court only to be again dismissed in September of 2005. On August 26, 2007 Hawaii Superferry Inc began service between Honolulu, Kahului, and Nawiliwili. The Superferry's initial attempt to dock in Nawiliwili was blocked by protesters, forcing it to turn back to Honolulu. Shortly after service began, it was halted when the Hawaii Supreme Court ruled that the Department of Transportation erred when they exempted harbor improvements required for ferry operation from environmental review. In November 2007 the state passed a law, Act 2, allowing the ferry to operate while the EIS was developed. Environmentalist groups and shipping officials again appealed to the Hawaii Supreme court and it ruled in their favor in May of 2009 stating "DOT simply did not recognize its duty to consider both the primary and secondary impacts of the Superferry project on the environment ... DOT wholly abandoned that duty by issuing an erroneous exemption to Superferry" and that in accordance with Chapter 343 the Superferry could not operate while the EIS was under development. The Superferry filed for bankruptcy protection in July of 2009.

2. Project Failure

The primary factor that led to the Superferry failure was the use of exemptions to navigate around the EA and EIS requirements. Regardless of the validity of the exemptions, the fact that they were used opened the door for litigation, and increased public scrutiny of the project. Although cost and schedule impacts for conducting the studies would have been high at project onset, the cost and schedule impacts after service initiation were unmanageable and the project had to be terminated. There were essentially three environmental impacts that the courts ultimately decided the project needed to evaluate: the use of the Superferry for interisland transport, the construction associated with harbor improvements required to dock the Superferry, and the use of the harbor improvement in conjunction with the Superferry. These areas of evaluation were closely associated with the three primary concerns voiced by the opposition to the project. The

first area of concern was impacts to marine life, in particular whale strikes which was to be covered under the environmental impact of the Superferry's operation, the potential for increased movement of invasive species, to be covered under the use of the harbor improvements by the Superferry, and increased neighbor island traffic also to be covered under the use of the harbor improvements by the Superferry.

a. Harbor Improvements

The State of Hawaii allocated a total of $40 million in state funds for improvements to the four harbors that were to be used by the Superferry project (The Sierra Club vs. the Department of Transportation of The State of Hawaii, 2007).

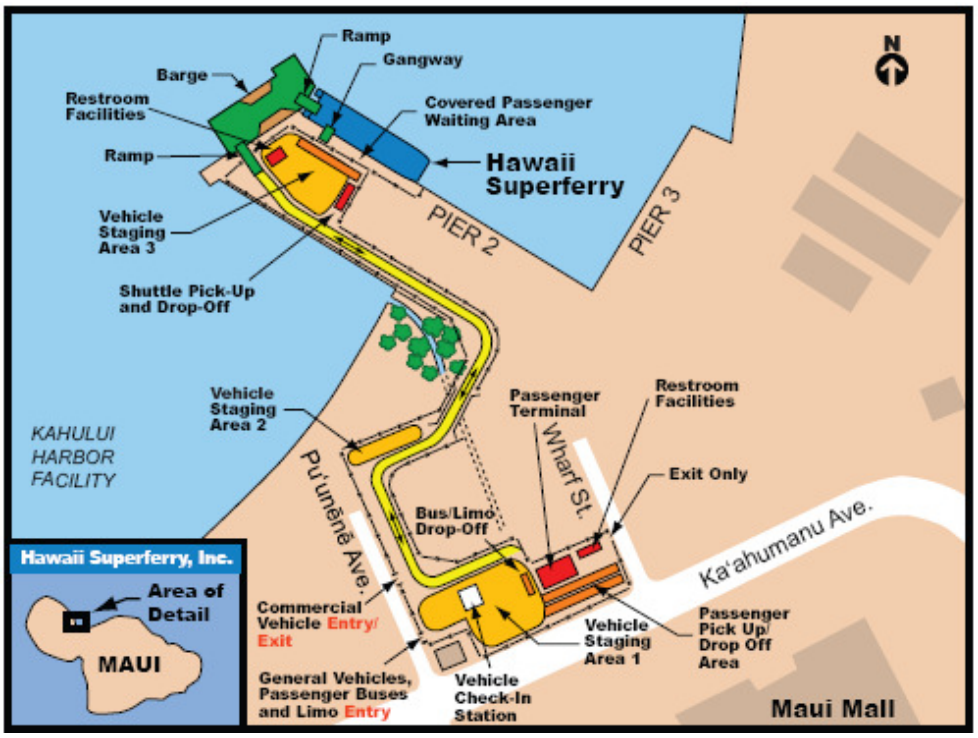

Figure 9. Harbor Improvements (From RedMaui.com)

The use of state funds for harbor improvement correctly triggered the EA process and the DOT developed a draft EA in June of 2004. In accordance with the HEPA's provisions for exemption, the DOT consulted with Hawaii's Office of Environmental Quality Control (OEQC) on the harbor improvements and draft EA. In November of 2004 OEQC

stated that "[t]he actions generally fall under exemption class 6 number 8 and exemption class 8 number 1 of DOT's approved exemption list" (The Sierra Club vs. the Department of Transportation of The State of Hawaii, 2007). This statement then paved the way for the exemption process, given that the improvements were minor and they only served to allow the Superferry the ability to use the harbor for what it was intended for.

What the DOT failed to properly evaluate within the exemption process were the secondary impacts that would arise through the use of the harbor improvements by the Superferry. The Supreme court of Hawaii ruled in 2007 in favor of the plaintiff stating: "The exemption was erroneously granted as DOT considered only the physical improvements to Kahului harbor in isolation and did not consider the secondary impacts on the environment," therefore, finding that the DOT did not appropriately follow the process, thus forcing them to conduct an EA, and closing the harbor for use by the Superferry.

b. Ferry Operation

Despite the need to conduct a comprehensive EA of secondary ferry impacts associated with the pier improvements to satisfy the requirements of HEPA, it was found that Superferry Inc. needed to conduct an EIS in accordance with NEPA. The NEPA process was applicable based upon the $140 million in federally guaranteed loans and the permit issued to the Superferry by the United States Department of Transportation (Department of Transportation, 2007).

3. Lessons Learned

Public concern over environmental issues can grow and spread quickly on the Hawaiian Islands, and the perception that the project is attempting to skirt environmental documentation requirements will only increase the public's concern over the project's potential environmental impacts. The purpose of both NEPA and HEPA policies is to put forth a process that enables the communication of environmental impacts. The use of this

communication process early in a project lifecycle is essential to reduce future project cost and schedule risk. Not only is this a lessoned learned and best practice, for projects subjected to NEPA regulations it is a requirement. "An agency shall commence preparation of an environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal (§1508.23) so that preparation can be completed in time for the final statement to be included in any recommendation or report on the proposal. The statement shall be prepared early enough so that it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made." The Council of Environmental Quality goes on to state that "For projects directly undertaken by federal agencies the environmental impact statement shall be prepared at the feasibility analysis (go-no go) stage and may be supplemented at a later stage if necessary (Council on Environmental Quality, 1978). For DoD projects following the DAU Systems Engineering Process, this means documenting and communicating the alternatives during the conduct of the AoA prior to Milestone A. For Department of the Navy (DON) projects, the requirement to start this process early is also codified in Code of Federal Regulations Title 32: Part 775 (U.S. Government Printing Office, 2013).

If the project is being executed as a sub-project, cumulative effects of the parent project must be evaluated.

Commitment to financing before environmental documentation is in place should be avoided. These financial commitments place schedule constraints on the project making legal delays an obvious tactic for those that oppose the project.

C. OUTRIGGER TELESCOPE PROJECT

1. Background

Mauna Kea is a volcano on the island of Hawaii. The peak of Mauna Kea at nearly 14,000 feet above sea level is the highest point in the state of Hawaii. Because of the stable dry atmosphere above the volcano, being above the inversion layer, and the distance from the city lights, the summit of Mauna Kea makes an ideal astronomical

observation location. In addition to its astronomical viewing properties, in Hawaiian mythology, the peaks of the island are sacred, and Mauna Kea one of the most sacred. Mauna Kea is also home to several endangered species, many of which have become endangered due to invasive species introduced when Europeans arrived on the islands in the 18th century. Given its scientific properties, sacred nature, and refuge for endangered species, Mauna Kea has had its share of environmental and legal challenges, a recent one being the addition of six telescopes to the existing 13 that already populated the summit.

Figure 10. Eleven of the 13 Telescopes on the Mauna Kea Summit (From Environmental News Service, 2006)

The Outrigger Telescope project was part of the National Aeronautics and Space Administration's (NASA) program to develop ground-based interferometry. The project, if completed, would have addressed all six of NASA's scientific objectives for ground based interferometry (National Aeronautics and Space Administration, 2005). The two existing telescopes Keck I and Keck II along with the Keck-Keck Interferometer which linked the two 10 meter telescopes together, allowed NASA to meet two of the six objectives. To meet the remaining four objectives, the project required connection of four

to six additional “outrigger” telescopes, which measured about one-third the size of the existing telescopes.

Figure 11. Concept of Four Outrigger Telescopes around the Existing Two Keck Telescopes (From Environmental News Service, 2006)

2. Project Failure

Since the additional telescopes were part of the overall project, NASA believed that the already produced EA was sufficient to move forward with the installation of the additional telescopes, which NASA had already built at a cost of $15 million. The Office of Hawaiian Affairs did not agree and filed suit against NASA seeking an injunction until NASA conducted an EIS as a follow-on to the already completed EA. The Office of Hawaiian Affairs (OHA) was created by the 1978 Hawaii State Constitutional Convention. The Office is a semi-autonomous entity of the state of Hawaii with the mission to “protect Hawaii’s people and environmental resources and OHA's assets, toward ensuring the perpetuation of the culture, the enhancement of lifestyle and the protection of entitlements of Native Hawaiians, while enabling the building of a strong and healthy Hawaiian people and nation, recognized nationally and internationally” (Office of Hawaiian Affairs , 2013). The Office is considered one of the most influential groups on the island, and when it comes to infrastructure development, they are a group that needs to be engaged early and engaged often. In this case, the US District Courts

agreed with the Office of Hawaiian Affairs, stating that NASA's EA "fails as a whole to recognize and consider the past actions on the summit of Mauna Kea," and “because there is no previous EIS or EA that encompasses the site of the outrigger telescopes’ project, NASA's obligation to consider the cumulative impacts of development at the Keck observatory is correspondingly greater” (Tytell, 2003). Without a choice, NASA then agreed to develop a full EIS that would encompass both the impacts of the outrigger addition and the cumulative impacts of all the past activity at the site. While the EIS was in development, in 2000 the University of Hawaii and the Office of Hawaiian Affairs revised the summit’s master plan to allow 19 domes, where the existing master plan approved in 1983 called for no more than 13 domes atop Mauna Kea, enabling the state land board to allow the project to proceed. This decision was met with another suit filed by Mauna Kea Anaina Hou, the Royal Order of Kamehameha I, and the Sierra Club's Hawai'i Chapter (Dayton, 2004). The EIS was completed in 2005 and NASA found that “From a cumulative perspective, the impact of past, present, and reasonably foreseeable future activities on cultural and biological resources is substantial, adverse and significant....In general, the Outrigger Telescopes Project would add a small incremental impact” (National Aeronautics and Space Administration, 2005). Regardless of the second suit, after spending roughly two million dollars on an EIS, in 2006, NASA canceled the program citing budget cuts.

3. Lessons Learned

As with the Superferry program, it was again found that the cumulative impacts were not adequately covered in the EA. In the case of the Superferry, cumulative referred to the harbor improvements combined with the ferry operation, and in the case of the Outrigger project, it was the new construction combined with previous construction. This case study demonstrates that under Hawaiian environmental impact assessment requirements, projects can be held to evaluating environmental impacts not just from the time of project initiation, but also from the time that significant environmental impact likely occurred.

Cultural impacts need to be equally considered. For this project, the actual environmental impacts were minimal; arguably the plans outlined in the EIS if executed would have relieved some of the previous environmental impact. For this project, the cultural impacts were the primary driver to litigation. Cultural impacts for projects on the Hawaiian Islands should not be dismissed in hopes that they can be addressed in conjunction with project execution.

VI. ANALYSIS

A. COMMON THEMES

In each of the three case studies, there were varying levels of resources invested in complying with the NEPA and HEPA, various agencies at the city, county, state and federal level that were involved with authoring and approving environmental analysis, and varying stumbling blocks that halted progress or led to project failure. Even with these variables there are common themes that can be gleaned from these studies.

The most significant common theme is if an individual or party does not support an infrastructure project and they have sufficient financial resources, they will be successful in establishing cause to bring suit against the project under either the NEPA or HEPA regulations. This individual or party can be a concerned citizen, a citizen group, an environmental group, a state or local agency, or a competing business interest. As demonstrated by the Superferry Project, competing business interests may have a significant amount to lose as a result of project success and their financial resources, coupled with environmental and cultural activism, can quickly push a project to failure.

Another significant common theme is that if a court rules in favor of the project and the quality of the environmental and land use documentation, it is really only the beginning of the process in regards to the courts dissecting the quality of the project's analysis. A project manager can count on either the case going to appeal or the plaintiffs taking a slightly different angle, utilizing lessons learned from past court proceedings regarding the project, and returning to the same court. When you couple the vast array of environmental, cultural, archaeological, and historical regulations in the state of Hawaii with the impact that any significant infrastructure project brings, there are essentially endless possibilities for bringing a project to court. This fact was clear in the nearly endless litigation surrounding the H-3 interstate project. The H-3 project was a federally funded highway connecting H-1 near Pearl Harbor to Marine Corps Base Hawaii. Orders for the freeway were granted in 1960, but due to environmental controversy and protests,

construction did not start until the 1980s. The project was finished in 1997. In total the project took nearly 40 years, cost 1.3 Billion dollars, and was only 16 miles long (Yuen, 2013). During one of the many court cases over the H-3 project, Judge Samuel P. King noted that "The court should not be used as a quasi-legislative or quasi-executive forum by those who are dissatisfied with policy decisions made by governing bodies." and "The environmental laws were neither meant to be used as a crutch for chronic fault-finding, nor as a means of delaying the implementation of properly approved projects" (Findings of Fact and Conclusions of Law Stop H-3 Association vs. United States Department of Transportation, 1982). Unfortunately, for a major infrastructure project, the NEPA and HEPA requirements as currently interpreted have opened the door for this so-called chronic fault-finding.

The final significant common theme is that for all of the litigation associated with each of the reviewed projects none of the projects made significant changes to the project plan. The additional reviews, paperwork, and scientific studies, although time consuming and expensive, did not drive major changes to the project. What this tells us is that the level of analysis required to enable sound project decisions is not sufficient to meet NEPA and HEPA communication requirements as determined by the court. This puts the judges in the driver seat when it comes to determining the adequacy of decision analysis and to be successful, the project will need to balance analysis requirements between appeasing the courts and technical requirements.

B. LESSONS LEARNED

1. Contract Award

After contract award, it becomes much more expensive for a project to defend its adherence to NEPA and HEPA requirements than it does to bring suit against it for potential non-compliance. The Superferry project provides a good example of this lesson. Because the Superferry itself was a private venture, the project sponsors had to take out significant loans to contract for the ferry's construction. Repayment of the loans required an operational Superferry. Once the plaintiffs filed suit against the Superferry for HEPA

and NEPA violations, the Superferry project had to cease operations while it defended its actions, which in turn stopped the revenue stream, forcing the project into bankruptcy. Had the project planned to settle the suits prior to contract awards then they may have had sufficient planning resources to address the court finding prior to contract award. In the case of the outrigger project, NASA after spending over $15 million on building the outrigger telescopes, and roughly two million on an EIS, decided to kill the program entirely. Had the litigation been completed prior to building the telescopes, NASA could have saved the $15 million in construction costs. This delta in cost burden between the plaintiff and defendant is easily used to the advantage of the plaintiff. Project managers need to take this into account during project planning. With the complex requirements governing environmental impact and land use in the state of Hawaii, what makes the most technical cost and schedule sense when it comes to contract type and award time may not equate to the optimal project plan when taking into account litigation. Litigation needs to be taken into account at the onset of project planning. Contract award dates, scope of the initial contract award, and cancelation clauses all need to be evaluated when determining cost and schedule risk associated with environmental litigation. Getting litigation out of the way before contract award is the lowest cost risk option but carries significant schedule risk, awarding a full contract prior to settling suits carries the lowest schedule risk, but highest cost risk. A balanced approach would involve an initial contract award to start construction, which keeps schedule risk low, flushes out the majority of environmental concerns, while not committing to the full construction contract, thus reducing cost risk.

2. Early Communication

The NEPA, HEPA, and the regulations that implement the acts all call for the early development of the EIS. “The [EIS] shall be prepared early enough so that it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made” (Council on Environmental Quality, 1978). From a Systems Engineering perspective, this means that the EIS needs to be

drafted in conjunction with the AoA, and for the DoD Systems Engineering Process this means that the EIS is drafted prior to Milestone A. In addition, the implementing regulations are clear that public participation is an important element of the process, and this is well stated in the DON implementation procedures. “The importance of public participation (40 CFR 1501.4(b)) in preparing environmental assessments is clearly recognized and it is recommended that commands proposing an action develop a plan to ensure appropriate communication with affected and interested parties” (U.S. Government Printing Office, 2013). What is not clear is when the project should initially engage with the public. Based upon the Federal and State Regulation, the project could complete the EA before soliciting comments, allow the required 45 day comment period and then publish the DEIS. The case analysis shows that simply meeting the requirement adds risk to the project, and to reduce risk the project should communicate more often, and communicate earlier.

The NEPA and HEPA requirements were enacted to support the communication of environmental impacts; however with advances in communication capabilities it is common for special interest organizations to widely communicate their stance on the project well before the initial EA is published. Often these views are based upon preliminary data, but because they are the first on the table, a reasonable percentage of the public will frame their views on this preliminary data. This places the project at a significant disadvantage, and turns the EA and EIS from a communication mechanism to a defense mechanism. Based upon the three case studies, it is clear that the EA, EIS and NEPA and HEPA requirements are a much better offensive mechanism than a defensive mechanism. Without early support or understanding of the Hawaiian people, it will be difficult to execute an infrastructure project without interruption due to lawsuit. If the project upon completion is expected to reduce environmental impact, when compared to the current methods, then this should be advertised well before the NOI for the EA is published. Also, if operation is expected to bring reduced environmental impact, separating the environmental impact of construction and operation will make it easier to communicate the true impact. The project needs to be in a position where the EA and EIS are confirming what is already known, while communicating what analysis was

conducted to arrive at the stated conclusions. Questions regarding the quality of the analysis supporting the EA or EIS arise when what is believed by public and special interest groups, right or wrong, is disputed. Once the environmental analysis disputes what is held belief, then the result is the special interest groups claiming that not all factors were taken into account. This is nearly impossible to dispute because there are essentially endless factors one would need to take into account, and the project is then forced to evaluate these additional factors regardless of their merit, either before or after the court forces the issue.

This lesson is best depicted by the Superferry project. The primary environmental issues cited for the Superferry project were the potential for whale strikes, the potential movement of invasive species, and increased neighbor island traffic.

Regarding whale strikes, the project had planned to modify the ferry route shown in yellow in Figure 12. during whale season, adding additional mileage to the regular off-season route shown in Figure 13. This change would move the route from the highly populated areas shown in red in to the lowly populated areas shown in yellow in Figure 14. , which was published by the National Oceanic and Atmospheric Administration (NOAA) and depicts the density of whale sightings between 1993 and 2003. In addition, the project plan called for employing two whale spotters, changing course within 500 yards of whales, and employing a water jet propulsion system vice a propeller. The draft EIS chapter 4.2.2.4 states that the Hawaii Superferry is not a threat to marine mammals because of its routes, and its world-leading whale avoidance policies.

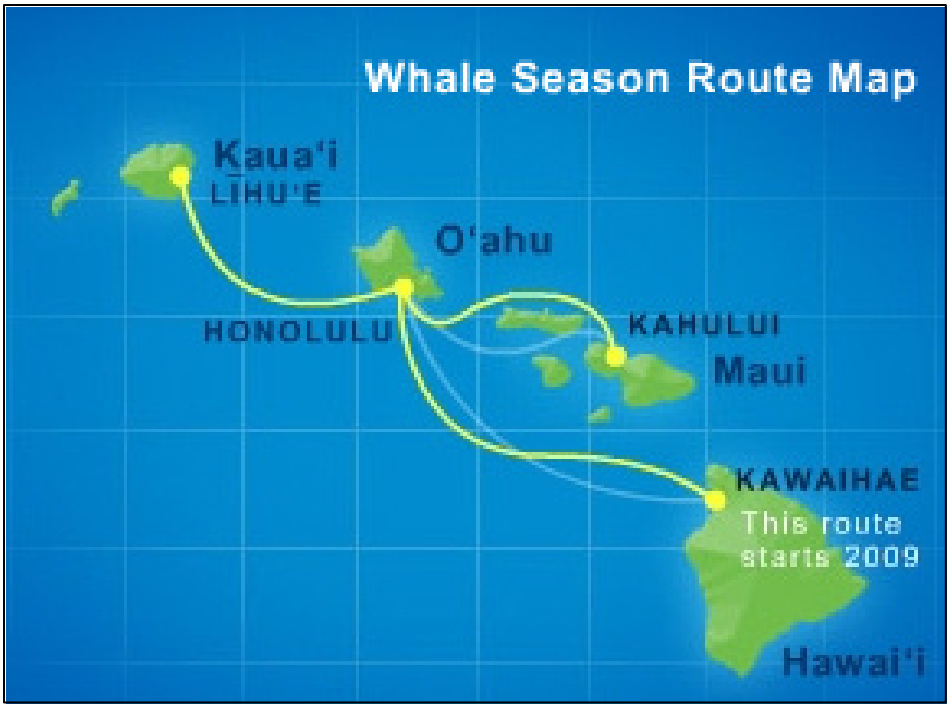

Figure 12. Superferry Route during Whale Season (From RedMaui.com)

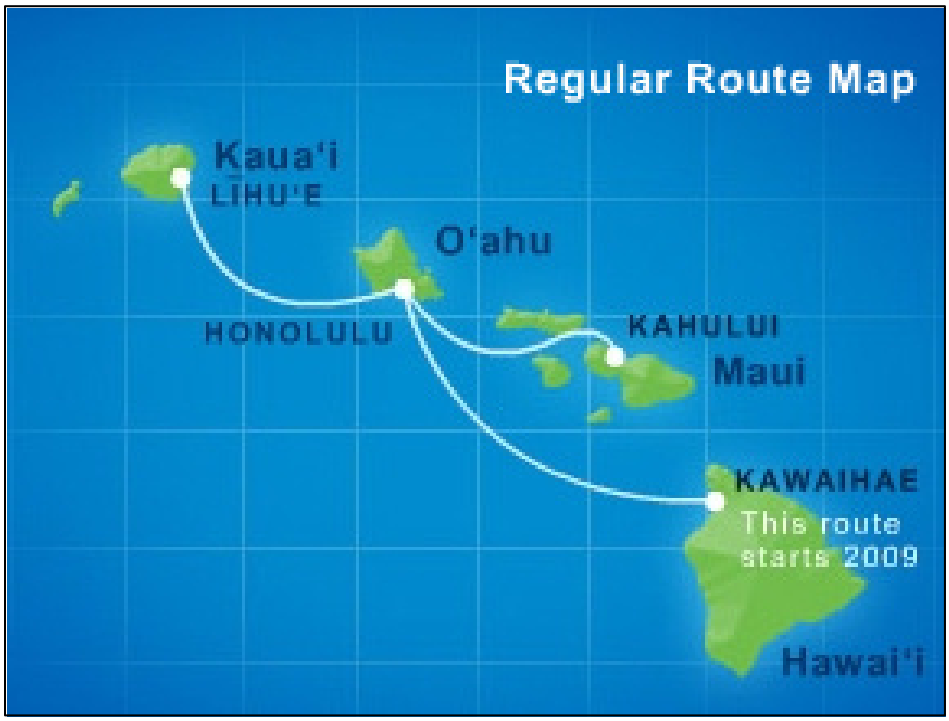

Figure 13. Superferry Regular Route (From RedMaui.com)

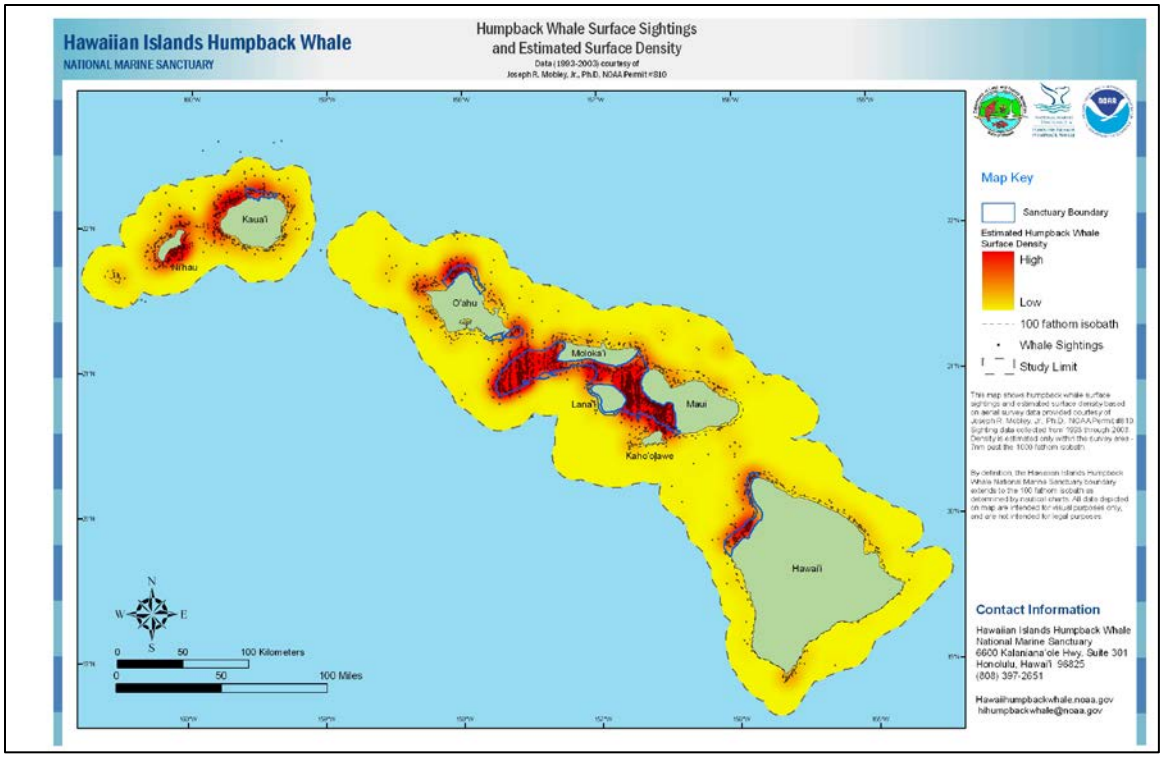

Figure 14. Humpback Whale Surface Sightings and Estimated Surface Density, Hawaiian Islands (From Mobley, 2004)

Unfortunately for the Superferry project, by the time the public became aware of such whale avoidance and protection measures they had already determined the project to be a threat due to the vessel's relatively high-speed, and no amount of data presented in the EIS could change that opinion.

With regard to the introduction of invasive species, the project called for inspection of vehicles, passengers, and luggage, and the prohibition of sealed containers that could not be inspected. The draft EIS states in chapter 4.2.2.1-3 that the Superferry is a small player vs. the barge and airlines and has no significant impact to the movement of invasive species, yet that had little impact on public sentiment, again by the time it was published in the EIS, the public's mind had been made up.

The final major issue was the impact on neighbor island traffic which was a valid concern especially for the smallest island serviced, Kaua'i, given that the ferry could

transport roughly 280 compact cars per trip. According to a 1994 report (MIYASAKI, 1994), there was just over 60,000 vehicles registered on the island of Kaua'i Assuming that there was not a decrease in registrations between 1991 and 2009, when the Superferry project filed for bankruptcy, and that the ferry was fully loaded with all vehicles departing in Kaua'i the ferry could have accounted for between a 0.5% and 1% increase in vehicle traffic on the island of Kaua'i. After calculating the numbers, it is clear that there at most could be an insignificant increase in traffic. Unfortunately, by the time they set out to address the misinformation, the public was convinced of the issue of island traffic.

The Superferry suffered from poor public perception; this coupled with the early failures to publish complete environmental documentation put the project on the defensive vice where it should have positioned itself, on the offensive. Outside of the limited environmental impact, the project should have focused on the inherent efficiencies associated with inter-island ferry transport when compared to the more common air travel, and the fact that the ferry vessels were designed with the environment in mind, running on low sulfur number 2 diesel instead of marine diesel, employing a zero wastewater discharge system, and utilizing non-toxic bottom paint. These facts, if published early, could have sold the concept as a way to reduce environmental impact, and perhaps saved the project from failure.

3. Cumulative Impacts

Another lesson learned is the requirement to not discount past or future harm in evaluation of environmental impact. The Council on Environmental Quality defines "Cumulative impact" as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." The Council further states that "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (Council on Environmental Quality, 1978).

Evaluating the project's environmental impact on the current environment will not meet the requirements of NEPA and HEPA if the current environment has already been degraded due to past projects. To satisfy the cumulative impact requirement, the project needs to document both the impact on the current environment and the combined impact of the project and all past projects executed at the site. As previously discussed, this was demonstrated in the Keck Outrigger project when the US District Courts stating that NASA's EA "fails as a whole to recognize and consider the past actions on the summit of Mauna Kea." And "because there is no previous EIS or EA that encompasses the site of the outrigger telescopes project, NASA's obligation to consider the cumulative impacts of development at the Keck observatory is correspondingly greater" (Tytell, 2003). Given the number of infrastructure projects that were executed prior to the enacting of NEPA and HEPA, the requirement to consider past impacts may prove costly as the project is essentially conducting an environmental survey for the existing projects and all previous projects where none exists.

In the case of the Keck Outrigger project, it was found that the addition of the outrigger telescopes would produce minimal additional impact "In general, the Outrigger Telescopes Project would add a small incremental impact" (National Aeronautics and Space Administration, 2005). However, the cumulative impact was substantial. To address the cumulative impact, NASA planned to implement mitigation plans that not only mitigated impacts of the Outrigger project, but also addressed existing impacts from past projects. As with the majority of the lessons learned, had NASA developed and communicated the intent to address existing environmental degradation in conjunction with new construction, the public may have supported the project and NASA could have used the dollars spent on litigation to fund the project.

4. Precedents

When it comes to meeting NEPA and HEPA requirements, precedents do not apply. Projects should not plan to not conduct an EA or EIS because similar or identical projects did not publish an EA or EIS in the past. Projects could have been executed prior

to NEPA and HEPA requirements or in many cases they flew under the public's and regulator's radar. Attempting to argue against the need for an EA and EIS based upon precedent adds significant risk to the project and goes against the lessons learned of early communication. The Superferry owners and former Hawaii Governor Linda Lingle demonstrated this lesson by setting the Superferry project on a troubled path from inception when it was decided that the project did not have to produce an EIS because one had not been required of any inter-island vessel in the past.

Much of the debate regarding the Superferry project centered on the state's 40 million dollar investment for upgrades to Maui's Kahului Harbor and the need to conduct an environmental study of the harbor improvements. However, after suit was filed, it was found that in addition to the evaluation of the harbor improvements themselves, the State needed to evaluate the effects of the Superferry's use of the harbor improvements. In the 2007 ruling which temporarily halted service, Maui Circuit Judge Joseph Cardoza stated that the Hawaii DOT's 22-year operating permit with the Superferry was invalid, being a new technology, the impact caused by the Superferry's use of the state harbors would need to be studied before the project could resume. This ruling established that an environmental assessment could be required for any vessel to use state owned equipment. This is in accordance with the HEPA regulation if a vessel operator applied for a permit that was processed using state funds. Prior to this ruling, there was precedent for vessels to use state harbors without requiring an environmental study on the impact of those vessels using the harbors, but this ruling demonstrates that given the wording of the NEPA and HEPA regulations, what has been excluded in the past is of little relevance to the present.

5. Project Interfaces

The importance of project interfaces is a lesson that was observed through examination of all three cases. Project interfaces can be separated into two categories; discrete project phases and interfaces between enabling projects.

Discrete project interfaces come into play when a major project is broken into discrete serial or parallel project phases. Often this is done to meet full funding requirements, conduct multi-year procurements, multi-contract awards, or to utilize proof of concept or spiral development approaches. The Honolulu rail project is an example of a project broken into discrete phases. The rail project consists of four phases based upon geographical location. Phase one runs East Kapolei to Pearl Highlands, Phase 2 Pearl Highlands to Aloha Stadium, Phase 3 Aloha Stadium to Middle Street, and Phase 4 Middle Street to Ala Moana Center as shown in Figure 15.

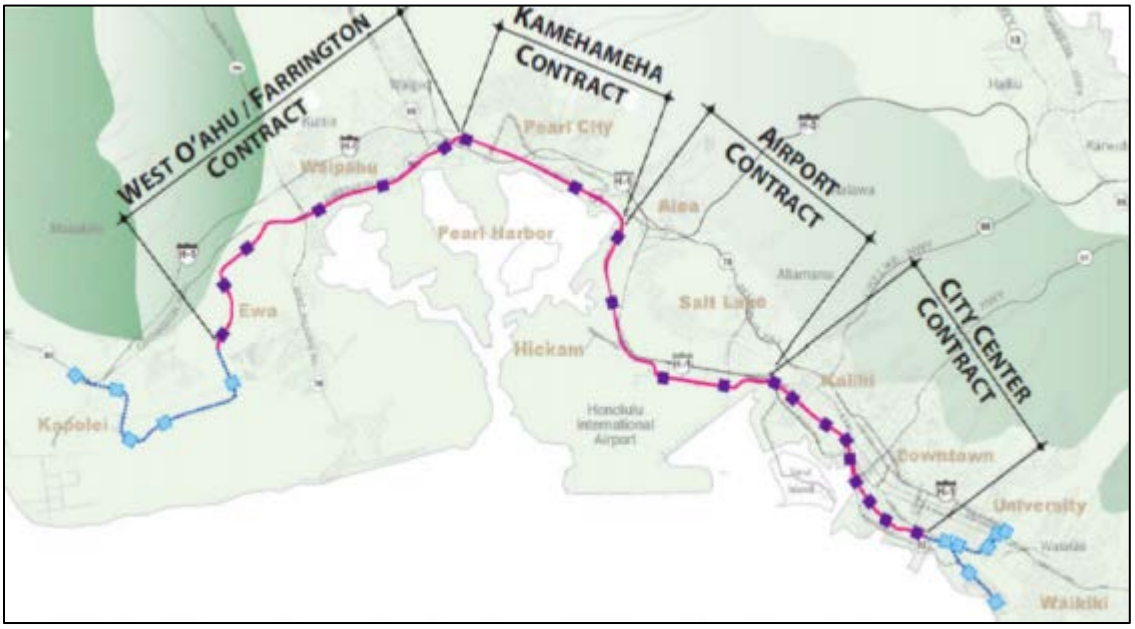

Figure 15. Construction Contract Phases (From Honolulu Authority for Rapid Transportation, 2012)

Opponents of the rail project believed that all environmental, cultural and historic analysis should be completed before construction on any portion of the rail project commenced. The City of Honolulu and State of Hawaii argued that it would complete the archaeological analysis for each phase prior to construction on the affected phase. The argument centered on the concept that construction on one phase had the potential to reduce the viable alternatives of a following phase. The Supreme Court of the State of

Hawaii found that the project plans were not in violation of HEPA requirements, but did find that the project was in violation of HRS chapter 6E, Hawaii's Historic Prevention Statute (Paulette Kaanohiokalani Kaleikini vs. Wayne Yoshioka, 2012). Although the project made it through the courts without a HEPA violation, the finding against the defendants set precedent that analysis needs to be complete for all project phases prior to the start of construction.

Interfaces between enabling projects come into play when two separate programs are executing development projects for which, upon completion, the two infrastructures will support each other. This support can clearly fall into the area of cumulative impacts as previously discussed regarding the Outrigger Telescope Project, or it can be loosely tied to cumulative impacts, as was the case of the privately funded Superferry project and State funded dock improvement project.

The Superferry program and the State of Hawaii entered into an agreement where the Superferry would provide ferry transportation and the state would provide docking services. The Superferry project could have planned to utilize existing infrastructure, but to increase the quality of service, chose to engage with the State on dock upgrades. Once this linkage was officially made, what both entities would later find as a result of litigation, from an NEPA and HEPA standpoint, the documentation of environmental impacts of construction of each project and utilization of the projects in conjunction with each other would need to be evaluated. For major projects, this can become tricky, especially if there are one-to-many and many-to-one interfaces between multiple projects. In the case of the Superferry, it was fairly straight forward because only the Superferry was planned to utilize the upgraded infrastructure, however, if more than one ferry service had planned to use the infrastructure, then all uses would have to be examined. This is particularly troublesome if funding is required from multiple sponsors, and negative environmental impacts between one sponsor pair could lead to a lack of funding for an enabling infrastructure for other projects. For cooperative projects, this forces project managers to carry risk from their project, the cooperative project, and any other project that is financially or programmatically tied to the cooperative project.

6. Lessons Summary

Across the three case studies, there were a number of lessons learned that fell into the five categories of contract award, early communication, cumulative impacts, precedence, and project interfaces. Within each of these categories, there was a reasonable amount of overlap, with a misstep in one area exacerbating or setting the stage for impact in another area. Overall, for a major infrastructure project, the only way to truly reduce risk is to begin the environmental and land use analysis early, to not attempt to shortcut or bypass even the smallest requirements even if the project currently has legislative and public support, communicate early and often, and budget both the time and money for the legal defense of your analysis.

C. APPLICABILITY TO THE DEPARTMENT OF DEFENSE

NEPA and most likely HEPA regulations will have a significant impact on all future DoD sponsored infrastructure projects on the islands of Hawaii. The cost and schedule impacts of meeting these requirements for a major infrastructure project can be assumed to at a minimum be tens of millions of dollars and numerous years. A primary concern is that feasible alternatives may exist, which drive the project cost and schedule outside of the DoD timeline to meet operational goals. Cost and schedule can be contained if the appropriate planning and risk mitigation strategies are employed. To properly execute these risk mitigation strategies, the DoD will have to invest in the initial stages of the project, something that could prove difficult given the manner in which funds are appropriated by congress.

Looking at the DoD projects that received FY13 funding appropriations, each project will have common and unique environmental challenges to overcome, both in construction and post-construction management. Major projects, such as the Combat Aviation Brigade Barracks, are already part of a well-documented facility master plan with an associated EA that covers infrastructure development for multiple years. Other projects are just now starting to develop their environmental analysis or moving forward in hopes that construction is covered under past analysis.

One project that will require special attention is construction in the Pohakuloa Training Area; this area is in a biological, historical, and archaeological area of significance and the base itself has a less than perfect public image due to past environmental missteps, the perception of cover-ups, and encroachment into sacred lands. The Pohakuloa Training Area is the largest of the DoD installations in Hawaii at over 100,000 acres. The training area and surrounding lands are currently designated as a conservation district. The training area is also home to nine animals and ten plants listed on the endangered species list. Nine archaeological sites have also been found within the training area, including a recently discovered petroglyphs site that forced the Army to abandon a recent multipurpose range complex project. Multiple residential properties are adjacent to the site and there is already public distrust of the management of the site due to the use of Depleted Uranium munitions that were initially undisclosed and the desire to use the “sacred” Mauna Kea and Mauna Loa areas for high altitude aviation training.

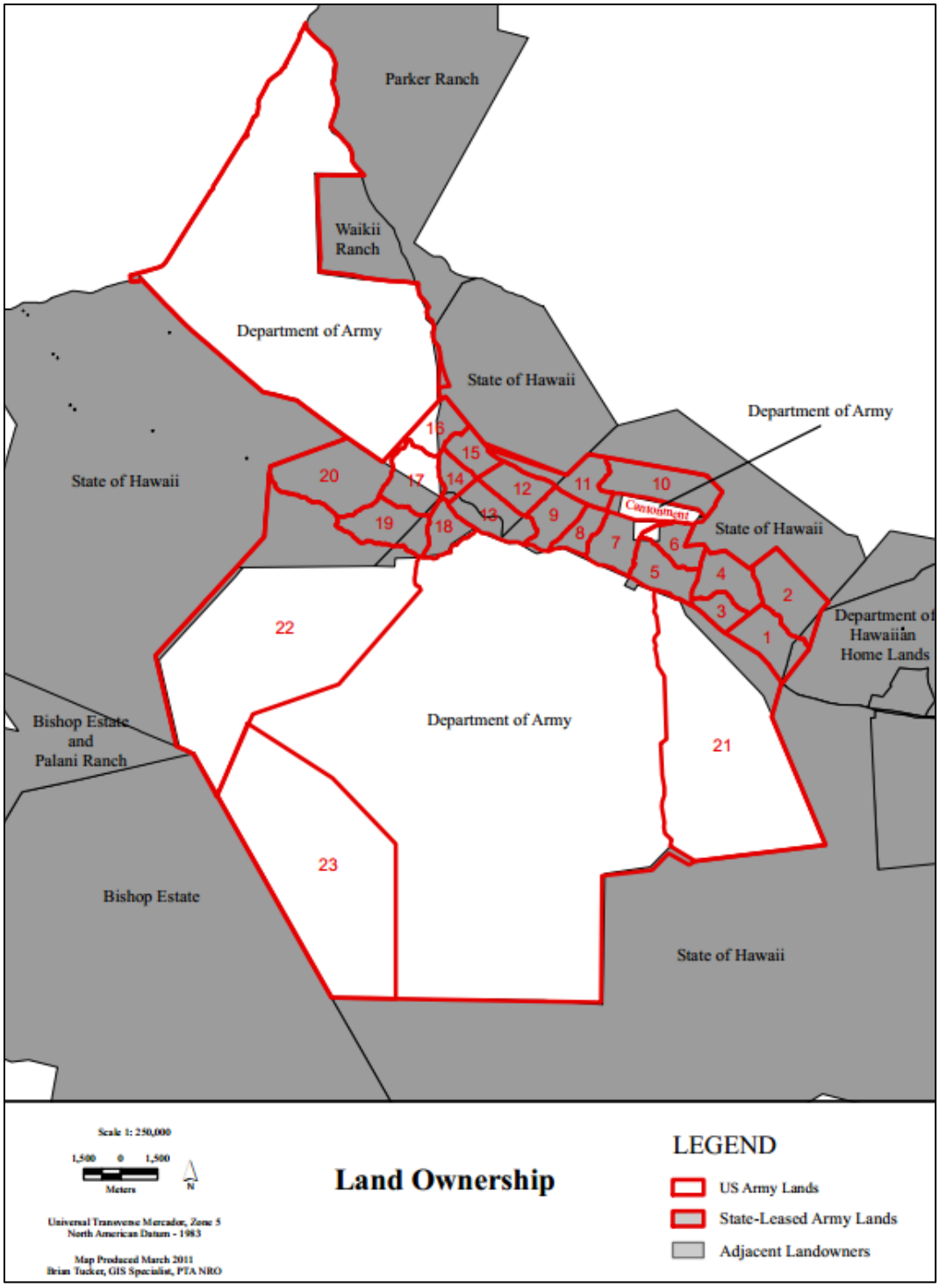

Figure 16. Pohakuloa Training Area and Surrounding Lands (From United States Army Garrison, Hawaii, Directorate of Public Works, Environmental Division, 2003)

The Army does have a 20 year natural resource management plan that identifies both preservation and enhancement of the natural environment within the training area (United States Army Garrison, Hawaii, Directorate of Public Works, Environmental Division, 2003). Even with the management plan, because much of the infrastructure at the training area was established before the expansion of environmental analysis and communication requirements were well established in the State, continued expansion of this facility may cause the Army to invest resources into past impact.

Another area that contains conservation land sections is Kaneohe Bay. Although sitting mostly on land that is classified as urban, it does have two conservation land sections, the Ulupau Crater and the Nuupia Pond Area, which need to be managed. As opposed to the Pohakuloa Training Area, the Kaneohe base itself has a fairly good public standing when it comes to environmental management, and has received numerous environmental management rewards to include 1984 Secretary of Defense Environmental Quality Award and the 1992 Secretary of the Navy Natural Resources Conservation Award.

The construction projects listed in the Appropriations Bill are all to be undertaken on existing military installations situated on federally owned land or land that is used via long term lease agreement. In many ways, this reduces the burden of the EA and EIS process because many of these facilities have published an EA or EIS for similar projects in the past. The primary issue that can arise while executing new construction of currently used facilities is the concern of cumulative impacts, as it did with the Outrigger Telescope Project. This concern can be mitigated, as demonstrated by the Combat Aviation Brigade Complex, by identifying both cumulative impacts and beneficial impacts up front (US Army Corps of Engineers , 2011).

If the Navy decides to invest in the infrastructure required to produce and transport bio-fuel in Hawaii, there will be significant environmental analyses to be conducted to meet NEPA and HEPA regulations. To reduce the schedule and financial risks associated with environment analysis and communication for a project of this

magnitude, the DoD will need to implement an environmental program that pulls from each of the lessons learned previously discussed and risk mitigation strategies in the next section. Because of the potential for economic and environmental benefit that can be realized through the execution of this project, if done correctly, early and lasting support of the public can be realized. If done incorrectly, the project could suffer setbacks similar to that of the Superferry which also planned to bring economic and environmental benefits to the islands.

D. RISK MITIGATION STRATEGIES

The most effective and potentially least costly risk mitigation strategy is early communication. The NEPA and HEPA regulations were put into place to ensure that communication was taking place between the government and the public when it came to impacting the environment. We have come a long way since 1970 when it comes to communication and environmental awareness. Today, we can be fairly certain that for any major or controversial infrastructure project in the state of Hawaii, there will be a significant amount of public communication well before the EIS is published. For this reason, the EA and EIS has moved from being an initial communication mechanism to more of a follow-up project defense and justification mechanism. The key to making it through the process is to craft your communication strategy so that the public and those elected to serve the public are hearing the true impacts from the project personnel, and not from each other. If the concerned stakeholders are getting early factual information, there is a lower probability that the speculation will get out of control. With speculation in check and impact facts both good and bad being communicated prior to the release of draft documentation, the documentation becomes an official record of what has already been communicated, which in turns builds trust. The goal is to ensure that the draft documentation is viewed as an affirmation, not a defense mechanism. Also, when preparing the final documentation, it is imperative that public comment on the draft documentation be accounted for in the final. If this is not done, it opens the project up for litigation.

Another risk mitigation strategy that should be executed from project inception along with the communication strategy is to develop an understanding of who the supporters, opponents, and undecided are, and why they are opposing. Some of the sharpest and financially able to oppose the project are business interests that stand to be adversely affected by the project. These business interests have the resources to combat the project in the courts and can supply the catalyst to rally the environmental and anti-development side of the argument. While one is working to plan and execute the project, opposing interests are working to build support for their opposition. Maintaining an understanding of the opposition and actively working to ensure the public has equal exposure to the facts regarding project impacts will reduce the size of the opposing force and cost and schedule risk later in the project.

A more costly strategy is to execute a comprehensive environmental review program from the onset. This would involve conducting analysis in excess of what would be required to make effective project decisions. This is a difficult balancing act for project managers who have been conditioned to make project decisions with 80% of the data. Analysis of these projects shows that the courts are looking for more data than the project managers are initially producing, and that number is inching up as time goes on. This case study only looked at project decisions, which according to court findings, should have been based upon additional analysis. This study did not evaluate the percentage of project alternative decisions that were not questioned by the courts, and therefore no conclusions can be drawn regarding the cost-benefit of increasing project-wide alternative analysis. For each project, the project manager is going to have to weigh the cost benefit of additional analysis with the understanding that the risk analysis needs to properly identify the severity of realization in the latter project phases. Simply identifying the severity may sufficiently create a new balance that drives the benefit of the additional analysis above the cost. Regardless of the decision to execute a comprehensive environmental review strategy, litigations, cost, and schedule need to be part of the project plan. The probability of publishing a final EIS without court review is quickly becoming a thing of the past. Litigation cost and schedule budgets need to track

to the magnitude of the environmental analysis plan, with high levels of analysis leading to smaller litigation budgets. Regardless of the budget, the project needs to have a defense strategy from the onset. The defense strategy needs to focus on the quality of the environmental analysis and if applicable, communicating that the project went above and beyond what the NEPA and HEPA require. This is opposed to the "justify why the analysis is not required" strategy that the three case studies unsuccessfully used on several attempts.

Addressing existing concerns may cultivate the public support and in turn reduce the risk of the project ending up in court. The requirement to evaluate cumulative impact can add a significant financial and schedule burden to a project; however, early planning and communication about these issues can work in the favor of the project. In many cases, due to technological advances and a greater understanding of our natural environment, it is not cost prohibitive to reduce or "clean-up" past harm to offset project impacts, and it may be feasible to walk away with a net decrease in environmental impact. If the project can communicate balance or a net reduction in the early project plans, environmental assessments opponents would be hard-pressed to package their opposition into a NEPA or HEPA context.

The final risk mitigation strategy is to work with supporting project managers and supporting agencies to develop an all-inclusive environmental and land use analysis and documentation strategy. If Project A is dependent upon the success of Project B then Project A is also dependent on Project B's environmental compliance strategy. Building this strategy from project onset will reduce project cost and schedule risk and may reduce project cost and schedule through elimination of redundant environmental analysis activities.

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VII. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The DoD has had a strong military presence in the state of Hawaii that dates before the infamous attack on Pearl Harbor in 1941. This presence is surely to become stronger as the DoD transitions to support the U.S. strategic shift in focus to the Asia-Pacific region. Unfortunately, despite the military's long history and significant contribution to the local economy, there is continued friction between the local communities and the military, with locals becoming increasingly concerned about the negative effects of military operations on the environment. This friction, if not managed effectively, will also become stronger in conjunction with the military's increased presence.

To execute the infrastructure development required to support an increased presence in the State of Hawaii, the DoD will need to effectively execute an environmental analysis and communication strategy for each infrastructure project. Executed successfully, these strategies can reduce project cost and schedule risk, while easing the friction between the services and the Hawaiian people. The effective execution of these strategies leads us to the questions that gave rise to this study.

1. Can the DoD reduce risk to major infrastructure development projects on the Hawaii Islands through a greater understanding of the EIS and EA development and communication process?
2. How important is public perspective to the success of major infrastructure projects on the Hawaiian Islands?

Based upon the research documented in this study, it is clear that the DoD can reduce risk to these major infrastructure projects by better understanding the development and communication process associated with the EIS and EA. One must understand that the development and communication of the EIS and EA needs to be used as a tool vice a check in the block. The research confirms one of the principal stumbling blocks for

infrastructure projects on the Hawaiian Islands is the development of the EIS and the EA, and that missteps in these areas have the potential to put a project on a path to failure. The research shows that it is not uncommon for the approval and litigation associated with these documents to add tens of millions of dollars and months or years of delays to major projects. For each case study, we found that if the money that was invested in addressing NEPA and HEPA litigation was invested in project planning, early analysis, and early communication, project schedules would have been reduced and cost savings would have been likely.

The research also shows that the management of public perception is of paramount importance to the success of infrastructure projects on the Hawaiian Islands, and the only way for the DoD to ethically manage this perception is to ensure that the public is provided factual data in which to develop their perception. The Hawaiian people have a long history of opposition to industrial development, especially in the rural areas and on the lesser populated islands. This, coupled with the existing friction with the military, makes it unlikely that public opinion will be favorable upon project announcement. Effective communication of the environmental impact will help to improve that perception, and the EA and EIS are tools that can be used to enable this communication. NEPA and HEPA were created to inform stakeholders, to include the public, of the environmental impact, mitigation measures, and alternatives to the proposed projects. Unfortunately, in today's society where information moves at the speed of light, simply meeting NEPA and HEPA requirements is insufficient to mitigate risk to an acceptable level. The research shows that project managers and project sponsors must start the communication process well before the NOI to publish an EA or EIS is filed. Communication needs to start before public opinion based upon beliefs and interpretations of vocal interest groups begins to form. Today, the EA and EIS needs to serve as a confirmation of the information that has been publicly shared throughout the analysis phase. If the EA or EIS is used to rebuff public perception, right or wrong, the project manager and project sponsor should have a healthy financial and schedule budget to address public perceptions in the courts. The case studies also show that there is a

growing expectation for the level of detail put into environmental analysis, and that the required level of detail is often beyond that needed to make sound project decisions. This needs to be accounted for when determining the scope of the environmental analysis required for project decisions and meeting NEPA and HEPA requirements.

As society becomes more aware of the delicate nature of our natural environment and takes steps to protect it against negative impacts, we can assume that the public's distaste for environmental derogation will continue to grow. This will further increase the attention to infrastructure projects, requiring a broader and more comprehensive environmental impact communication strategy. This will prove challenging as we enter what appears to be a fiscally conservative time when it comes to defense spending.

Currently DoD focuses on compliance with regulations, not project risk reduction. This is an important distinction. Existing guidance is focused on meeting NEPA regulations without focus on understanding the social challenges, which can be as great as the technological and regulatory challenges, when it comes to environmental management. DoD guidance needs to extend beyond regulations to include an understanding of these complex social challenges and the development of an associated risk management strategy. To be successful, the DoD needs to have a comprehensive strategy to meet the increasing demand for environmental impact review, prior to the execution of infrastructure development projects. This plan needs to focus on developing a balanced risk strategy using the lessons learned and mitigations presented within this thesis. With a sound plan and the support of the Hawaiian people, the coming years can bring successful movement toward the strategic Pacific shift, economic prosperity for the state of Hawaii, and a renewed trust and cooperation between the military and the Hawaiian citizens.

B. AREAS TO CONDUCT FUTURE RESEARCH

From the research conducted, it is clear that additional investment in early environmental analysis and communication will reduce project cost and schedule risk. What was not resolved was the relationship between the size of the investment and the

level of risk reduction. The analysis shows that the investment is primarily a function of the project scope, initial public opinion, resources of the opposition, and true environmental impact. It would be beneficial to better understand the relationship between these factors and develop a planning model that assists the project manager with scoping the environmental analysis and communication aspects of the project. This model could serve useful both for initial planning and re-planning as factors change during the project lifecycle.

Another area of further study should be the cost benefit of meeting the HEPA and NEPA regulations. It would be beneficial to identify concepts that could decrease the resources required for litigation and litigation avoidance, and increase resources utilized to implement more robust environmental protection measures within the project plan.

APPENDIX: NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, §4(b), Sept. 13, 1982)

An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969."

Purpose

Sec. 2 [42 USC § 4321].

The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

CONGRESSIONAL DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

Sec. 101 [42 USC § 4331].

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential

considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;

5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Sec. 102 [42 USC § 4332].
The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

(i) the State agency or official has statewide jurisdiction and has the responsibility for such action,

(ii) the responsible Federal official furnishes guidance and participates in such preparation,

(iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts,

prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this Act; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by title II of this Act.

Sec. 103 [42 USC § 4333].
All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

Sec. 104 [42 USC § 4334].
Nothing in section 102 [42 USC **§** 4332] or 103 [42 USC **§** 4333] shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State

agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

Sec. 105 [42 USC § 4335].

The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

Sec. 201 [42 USC § 4341].

The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban an rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

Sec. 202 [42 USC § 4342].

There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, aesthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

Sec. 203 [42 USC § 4343].

(a) The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

(b) Notwithstanding section 1342 of Title 31, the Council may accept and employ voluntary and uncompensated services in furtherance of the purposes of the Council.

Sec. 204 [42 USC § 4344].

It shall be the duty and function of the Council --

to assist and advise the President in the preparation of the Environmental Quality Report required by section 201 [42 USC **§** 4341] of this title;

to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

to report at least once each year to the President on the state and condition of the environment; and

to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

Sec. 205 [42 USC § 4345].
n exercising its powers, functions, and duties under this Act, the Council shall --

consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order No. 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

Sec. 206 [42 USC § 4346].
Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates [5 USC **§** 5313]. The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates [5 USC**§** 5315].
Sec. 207 [42 USC § 4346a].
The Council may accept reimbursements from any private nonprofit organization or from any department, agency, or instrumentality of the Federal Government, any State, or local government, for the reasonable travel expenses incurred by an officer or employee of the Council in connection with his attendance at any conference, seminar, or similar meeting conducted for the benefit of the Council.

Sec. 208 [42 USC § 4346b].
The Council may make expenditures in support of its international activities, including expenditures for: (1) international travel; (2) activities in implementation of international agreements; and (3) the support of international exchange programs in the United States and in foreign countries.

Sec. 209 [42 USC § 4347].
There are authorized to be appropriated to carry out the provisions of this chapter not to exceed $300,000 for fiscal year 1970, $700,000 for fiscal year 1971, and $1,000,000 for each fiscal year thereafter.

The Environmental Quality Improvement Act, as amended (Pub. L. No. 91- 224, Title II, April 3, 1970; Pub. L. No. 97-258, September 13, 1982; and Pub. L. No. 98-581, October 30, 1984.

42 USC § 4372.

(a) There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality (hereafter in this chapter referred to as the "Office"). The Chairman of the Council on Environmental Quality established by Public Law 91-190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate.

(b) The compensation of the Deputy Director shall be fixed by the President at a rate not in excess of the annual rate of compensation payable to the Deputy Director of the Office of Management and Budget.

(c) The Director is authorized to employ such officers and employees (including experts and consultants) as may be necessary to enable the Office to carry out its functions ;under this chapter and Public Law 91-190, except that he may employ no more than ten specialists and other experts without regard to the provisions of Title 5, governing appointments in the competitive service, and pay such specialists and experts without regard to the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates, but no such specialist or expert shall be paid at a rate in excess of the maximum rate for GS-18 of the General Schedule under section 5332 of Title 5.

(d) In carrying out his functions the Director shall assist and advise the President on policies and programs of the Federal Government affecting environmental quality by --

providing the professional and administrative staff and support for the Council on Environmental Quality established by Public Law 91- 190;

assisting the Federal agencies and departments in appraising the effectiveness of existing and proposed facilities, programs, policies, and activities of the Federal Government, and those specific major projects designated by the President which do not require individual project authorization by Congress, which affect environmental quality;

reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;

promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encouraging the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;

assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;

assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established throughout the Federal Government;

collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation.

(e) The Director is authorized to contract with public or private agencies, institutions, and organizations and with individuals without regard to section 3324(a) and (b) of Title 31 and section 5 of Title 41 in carrying out his functions.

42 USC § 4373. Each Environmental Quality Report required by Public Law 91-190 shall, upon transmittal to Congress, be referred to each standing committee having jurisdiction over any part of the subject matter of the Report.

42 USC § 4374. There are hereby authorized to be appropriated for the operations of the Office of Environmental Quality and the Council on Environmental Quality not to exceed the following sums for the following fiscal years which sums are in addition to those contained in Public Law 91- 190:

(a) $2,126,000 for the fiscal year ending September 30, 1979.

(b) $3,000,000 for the fiscal years ending September 30, 1980, and September 30, 1981.

(c) $44,000 for the fiscal years ending September 30, 1982, 1983, and 1984.

(d) $480,000 for each of the fiscal years ending September 30, 1985 and 1986.

42 USC § 4375.

(a) There is established an Office of Environmental Quality Management Fund (hereinafter referred to as the "Fund") to receive advance payments from other agencies or accounts that may be used solely to finance --

study contracts that are jointly sponsored by the Office and one or more other Federal agencies; and

Federal interagency environmental projects (including task forces) in which the Office participates.

(b) Any study contract or project that is to be financed under subsection (a) of this section may be initiated only with the approval of the Director.

(c) The Director shall promulgate regulations setting forth policies and procedures for operation of the Fund.

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